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THE MECHANICALISATION OF FIELD ARTILLERY.

A Lecture delivered at the Royal Artillery Institution, on Tuesday, 29th January, 1924.

BY LIEUT.-COLONEL & BT. COLONEL C. C. ARMITAGE, C.M.G., D.S.O., R.A.

Colonel E. O. Lewin, C.B., C.M.G., D.S.O., in the Chair.

THE CHAIRMAN, in introducing the Lecturer, gave the general scope that would be covered in the lecture and in the subsequent proceedings. He pointed out the fitness of the lecturer for the task he had undertaken in view of his experience with the 9th Bde. R.F.A. during the past year.

COLONEL ARMITAGE: Gentlemen, there are many gunners who dislike the idea of having to face the problem of the mechanicalisation of the Royal Regiment of Artillery. They feel that the tradition of the regiment has been built up largely on the horse, and if that disappears esprit-de-corps and moral will suffer. In my opinion that view is an exaggerated one. Consider the analogy of the Royal Navy. That service has survived the change from sails to steam, although there were many pessimists at the time of that change. I think that if the authorities decide to proceed further with the mechanicalisation of the Royal Regiment, that change can be faced with absolute confidence, and in the certainty that moral and esprit-de-corps will be maintained at its present standard.

1. SYSTEMS OF MECHANICALISATION FOR FIELD ARTILLERY.

There are four main systems of mechanicalisation :—

(a) The gun hauled on its own wheels by a tractor.
(b) The gun carried on a machine from which it cannot fire.
(c) The gun carried on a machine from which it can fire, if required.
(d) The gun mounted permanently on the machine on a central pivot mounting.

The relative advantages and disadvantages of these systems are as follows :

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System (a). The gun hauled on its own wheels by a tractor.

Advantages.

(i) A light and narrow tractor will do the required work.
(ii) The gun and carriage require no modification except in small details.
(iii) The tractor can carry without difficulty the personnel of the detachment and an ample supply of ammunition.
(iv) The gun can be brought into and out of action very rapidly.
(v) The gun is independent of the tractor and therefore there is great flexibility.
(vi) In the case of a direct hit both gun and tractor are not likely to be destroyed.

Disadvantages.

(i) The speed must be limited to what the gun and carriage will stand. This does not appear to be a serious drawback; speeds of 8—11 m.p.h. have been used without damage to the equipment.
(ii) The obstacle crossing power is somewhat limited by the gun wheels.
(iii) It is difficult to push the gun backwards.

System (b). The gun carried on a machine from which it cannot fire.

Advantages.

(i) There is no wear to the gun due to vibration when travelling.
(ii) The machine is handy, reversing is simple.
(iii) The speed and obstacle crossing power are slightly greater than in system (a).

Disadvantages.

(i) Additional weight and width are required for the machine. Both these disadvantages are serious, especially the latter.
(ii) The space for the detachment and ammunition is limited, necessitating a larger number of machines per battery or less ammunition.
(iii) There is delay in loading and unloading the gun and ammunition from the machine, and consequent slowness in getting the gun into action. This can be obviated by towing the gun into and out of action.
(iv) Special arrangements are required for giving cover when in action to the detachments.

System (c). The gun carried on a machine from which it can fire, if required.

The pros and cons are the same as for system (b) but the power to deal with a surprise attack is gained. The difficulties of design are considerable.

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System (d). The gun mounted permanently on the machine on a central pivot mounting.

Advantages.

(i) This has all the advantages of carrying.
(ii) The gun is always ready for action on a good platform.
(iii) The system provides a mobile form of artillery, particularly suitable for close support and anti-tank work.
(iv) There is excellent mobility for the gun; protection is obtained by movement rather than by concealment and armour.

Disadvantages.

(i) There is increased vulnerability owing to the machine and gun being one.
(ii) The machine and gun are conspicuous in action.
(iii) There is a lack of flexibility in the event of casualties or mechanical breakdown.
(iv) The system involves considerable weight and width for the machine and limited space for the detachment and ammunition.

Considering the above and bearing in mind the fact that it is undesirable to have a very heavy or broad machine.

System (a). This has much to recommend it and has been used successfully by the 9th Brigade, R.F.A., at practice camp and on manœuvres in 1923. The gun-carriage and sights have suffered little from the vibration, but as the speed of the machine increases the damage due to vibration may be more apparent. The advantages of this system are very great and the disadvantages are not serious..

System (b). This system has many drawbacks due to the weight and width of the machine, to limitations in ammunition carrying capacity and space for personnel, and it offers few advantages over system (a).

System (c). This system has great advantages over system (b) but the difficulties of design are considerable.

System (d). The chief disadvantage of this system is that it is not possible to separate the gun from its machine, and for this reason it cannot be considered suitable for field artillery. It offers however a very mobile form of artillery, especially for close support and anti-tank work, and should be developed by the Royal Artillery.

The ideal solution of the problem appears to lie in the adoption of a suitable gun and carriage carried on a machine (system (c)), capable of firing from that machine in an emergency, but normally used on the ground. The difficulties in the design of such a machine and gun-carriage are however very great, and so long as the present 18-pdr. Mark V carriage for field artillery is used, the development of system (a), the tractor machine, which has proved its practical utility, appears to be the soundest policy.

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2. General Type and number of Machines required.

The most important machine is that for pulling or carrying the gun and its ammunition. The Dragon F.A. Mark I, an all-round track vehicle, is fairly satisfactory for both the above purposes.

The next machine in importance is that for the carrying of battery staffs. No thoroughly suitable vehicle has yet been produced for this work. The Citroen-Kegresse car (a semi-track machine) is of moderate value and cannot be considered more than a make-shift. A small three-seater machine with an all-round track is required. The motor-cycle for orderly work is not entirely satisfactory and a track motor-cycle has not yet been produced.

Until some suitable cross-country vehicle for battery staff work is produced, it is essential that a small pool of horses should be provided for each battery. If marches over 30 miles are carried out, the horses may not be able to keep pace with their batteries, and in this eventuality reconnaissance may have to be carried out on foot and will be slow. The question of the carriage of horses in lorries is under consideration by the War Office.

In considering the question of the design of a machine for battery staff work it must be remembered that no machine can be designed which will exactly replace the horse. Machines will be produced which will do certain work more efficiently than the horse and other tasks less efficiently. No machine will ever do work in trappy and very enclosed country so well as a horse. Provided however that a machine is produced with far greater speed and radius of action than the horse, and with the power to negotiate any ordinary enclosed country at slow speeds, it is probable that it will fulfil the functions necessary for the efficient performance of reconnaissance work for mechanical artillery.

A workshop lorry for brigade headquarters and a few one-ton vans and 30 cwt. lorries (with kitchen or water cart trailers) for the carriage of stores, spare parts and supplies will also be required for each brigade R.F.A.

3. The Mechanical Vehicles issued to the 9th Brigade, R.F.A.

(a) The mechanical vehicles which have been issued to the 9th Brigade, R.F.A., are shown below :—

	Dragons F.A. Mk. 1.	Motor Cycles & Sidecars.	Sunbeam Cars.	Citroen Kegresse Cars.	Crossley Tenders.	Lorries 3 Ton.
Brigade H.Q. ...	—	2	1	2	—	—
Each Battery ...	4	3	1	1	1	1
Spare	2	—	—	—	—	—
Total	18	14	5	6	4	4

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(b) The details of the Dragon F.A. Mark I are as follows :—

Length	16′ 7″.
Width	9′ 3″.
Height	7′ 0″.
Height with detachment	8′ 10″.
Engine	Leyland Lorry, 45—60 B.H.P.
Speed	4 to 13 m.p.h.
Weight—loaded	9 tons 7 cwt.
Gun and Limber	$2\frac{1}{2}$ tons.
Climbing power	15°.
Ammunition (18-pdr.)	64 rounds.

The Dragon F.A. Mark I has been a success as an experimental machine, but cannot be considered suitable or sufficiently reliable for active service. Its chief defects are its weight, width, height, noise and lack of power.

The track has done remarkably well. The average distance run by machines of the 9th Brigade, R.F.A., is 656 miles. One battery has run 829 miles per machine and one machine has completed 930 miles. An experimental machine has done 1200 miles. The life of the track is probably between 1,000 and 1,500 miles, and with certain further improvements a minimum life of 1,500 miles should be possible.

4. Characteristics of Mechanical Field Artillery.

(a) *Mobility.*

With the Dragon F.A. Mark I a field artillery brigade can move at the rate of $6\frac{1}{4}$ miles per hour including halts, and can cover 60 miles a day without any undue exhaustion of the detachments. Distances of from 30 to 40 miles a day were frequently covered during divisional training in August, 1923.

Cross country movement is possible at low speeds over practically any ground that can be negotiated by horsed artillery. A Dragon has been tested over rocky country on the Indian frontier with satisfactory results.

The Dragon F.A. Mark I is about equal in pace to the horse over short distances, and at distances of 4,000 yards and over it is much superior.

(b) *Invulnerability.*

Mechanical artillery is considerably less vulnerable than horsed artillery.

Ground Attack. A mechanical battery is not so vulnerable to artillery, rifle, and machine gun fire as a horsed battery, and can defend itself more easily. Practically the whole of the battery personnel is free to use rifles or Lewis guns for defensive purposes. There are no vulnerable horse-lines open to attack. It may be thought that the effect of a lucky shell hitting a dragon will have more serious results than a similar casualty to a gun team. It must however be

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remembered that behind each gun-dragon will be a dragon for ammunition only, and this machine will be available for hauling the gun if required.

Air Attack. An attack by machine gun fire from the air will do little damage. A bombing attack from the air will not have serious results unless direct hits are obtained on the machines and the odds against this are very large. On the other hand consider the possibility of a horsed field artillery brigade (600 horses) undergoing a bombing attack from the air under modern conditions.

Surprise. The element of surprise is not so disconcerting to a mechanical as to a horsed battery. Cavalry or infantry will not have a very easy task even if they succeed in surprising a mechanical battery in movement.

Invisibility. When in movement a mechanical battery is as visible as any other battery. Once in action it is easy to hide the machines. There is little movement in the wagon lines and no watering of horses.

As regards the visibility from the air of track vehicles when compared with horsed vehicles. It seems probable that the passage of track vehicles is easier to detect over most types of country than that of horsed vehicles, but as soon as the vehicles reach their destination the reverse is the case. Tracks made by horses are extremely easy to detect on air photographs especially if the animals have to be kept in one place for any length of time. Taking all the facts into consideration it appears that the mechanicalisation of artillery will not make the spotting of guns or gun-positions any easier than it is with horsed artillery.

Gas—Disease—Exhaustion. A mechanical unit will not be so subject to these dangers as the horsed unit.

(c) *Ammunition Supply.*

With 4 Gun-Dragons and 4 Ammunition-Dragons per battery it is possible, with the Dragon F.A. Mark I, to carry 258 rounds per gun (18-pdr.) distributed as follows :—

Gun Dragon.	*Ammunition Dragon.*
64 rounds on Dragon.	80 rounds on Dragon.
38 rounds in gun dragon wagon limber	76 rounds in wagon towed behind.
Total—102 rounds.	Total—156 rounds.

Total per gun—258 rounds.

The method of supply in action is not so quick and easy as in horsed artillery. In the first place each gun comes into action with its limber (38 rounds). Further ammunition is supplied by dropping an ammunition wagon complete for each section or by dumping Bethlehem steel boxes (4 rounds per box) in the vicinity of the guns. The replenishment of ammunition from rear echelons will be a simple

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matter as supply will not be limited by the physical power and speed of the horse.

(d) *Establishments.*

Assuming that a liberal establishment is given to a mechanical brigade together with a pool of riding horses for each battery, there will be a saving, when compared with a horsed brigade, in peace of about 100 O.R's and 216 horses per brigade, and in war of about 150 O.R's and 550 horses per brigade. There will be this definite saving in fighting man power and horses, but there will not necessarily be a saving in total man-power. A lower category man can however be used in the rearward services, and a smaller number of men will be exposed to active service conditions.

(e) *Cost.*

It has not been possible to get reliable figures as to the comparative cost of a horsed and mechanical brigade. It is probably safe to say that, as soon as the experimental stage is over, 5 mechanical brigades will cost the same in peace as 4 horsed brigades.

5. Training, Moral, and General Efficiency.

Provided that the same type of officer is attracted to the Regiment as in the past, there is no reason why the introduction of mechanicalisation should involve a lowering of discipline or moral. There will be more variety in the work, more time will be available for drill, and the men will be learning something which will be of value in civil life.

To compensate for the loss of the horse, batteries will have to go in for dismounted sports and games to a greater extent.

The general efficiency of batteries should be increased as less time is required for the maintenance of machines than for the exercise and care of horses. Battery training will be simplified. It will be possible to concentrate on one thing at a time.

In war the maintenance of the standard of mechanical knowledge should not be a difficult matter, as it will be possible to obtain recruits with this knowledge.

6. The Tactical Aspect.

In the Aldershot Command report on collective training for 1923 it is stated that :—

> "Generally speaking, the experience gained this year has shown that artillery units with mechanically moved guns and ammunition vehicles are, on the whole, tactically superior to those with horse-drawn vehicles."

The advantages of mobility and invulnerability have already been mentioned and will enable artillery to be handled more boldly than in the past.

An increased supply of ammunition will be available and replenishment from rear echelons will be simpler and quicker.

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The road space problem is still a difficult one and will not be solved until more experience has been gained in the handling of mechanicalised artillery units. With the Dragon F.A. Mark I there is no saving in road space as compared with horsed artillery, although there are less vehicles on a given length of road.

The great mobility of mechanical artillery will however lend itself to rapid movement by bounds, and marches in slow moving columns on roads should be avoided whenever possibble. This is a matter of staff work regarding which more practical experience is required in the army as a whole.

The chief defects of mechanicalised artillery from a tactical point of view are the noise of the machine and the lack of flexibility of battery staffs. The former is chiefly apparent when a battery is moving fast on a road and will be lessened as design improves; the latter can be overcome by employing small machines and having many of them.

7. The Strategical Aspect.

The introduction of mechanical artillery favours surprise, mobility, and the concentration of superior force at the decisive time and place.

There will be a reduction in the number of vehicles and horses with an army, and this together with increased mobility will facilitate the handling of artillery reserves by the higher Command, and will render surprise and concentration of superior force more easily attainable. Speeds of concentration of artillery will be greatly increased.

And lastly it must not be forgotten that the mechanicalisation of artillery is only a means to an end—a means of improving the mobility of artillery and of making that arm less vulnerable and more efficient.

The change can only be introduced gradually. The time seems to have come when it appears to be desirable to mechanicalise Army Field Artillery Brigades, and when these have proved their efficiency, it will be time enough to consider the case of Divisional Artillery.

The role of the artillery has not changed:

> "To assist the other arms in breaking down opposition and to afford all possible support to the infantry with whom the eventual decision rests."

By the aid of mechanicalisation artillery will be able to carry out its role more efficiently.

A discussion followed on questions of policy regarding the mechanicalisation of the various branches of the artillery, both of the Regular and of the Territorial Army, but as a final decision on these matters has not yet been arrived at by the Army Council, it has not been found possible to publish details of the discussion.

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THE COURSE OF FUTURE WARS.

By MAJOR-GENERAL SIR W. E. IRONSIDE, K.C.B., C.M.G., D.S.O.

THE following paper is an attempt to depict the probable course of future wars between states divided by a land frontier.

In 1914, the general belief prevailed among military authorities that a modern war would be of short duration. No nation had prepared for a long struggle. All efforts had been directed towards developing a quick mobilization and concentration, followed by a tremendous blow, calculated to sweep all before it. The decisive battles of the campaign were expected to commence about the 15th day of mobilization. Financial authorities supported the military authorities in thinking that a modern war would be short, stating that European nations had become so interdependent that none could bear the strain of lengthy operations. Many even declared that war was now impossible for this very reason. A campaign of about the length of the Franco-German War of 1870 was generally predicted.

Germany, France and Russia each delivered a great blow. In each case, in varying degrees, the force of the blow was met by the opponent and parried. Static warfare then ensued, owing to the superiority that had been gained by the defensive over the offensive, and the impossibility of turning the flanks of the land forces through the employment of sea-power.

The German blow nearly succeeded. Its failure was due in a lesser degree to bad leadership, as was the case with the Russian blow, but in a greater degree to the fact that the strategical conception was too great for the administrative possibilities of the situation. Had these blows succeeded, the war would not have been a long one.

After the experience of the late war, every state has taken careful stock of its national resources, so that it may not be caught napping by a long campaign in future. No state will risk again going to war without being prepared for a long one, but that is by no means to say that future campaigns will be lengthy. In fact, with the terrible results before them of a long war, upon both conquerors and conquered alike, we may be sure that a state contemplating war will strain every nerve to ensure success in as short a time as possible.

The question for us to consider is whether a great blow, carefully prepared in the light of past failure and supported by every modern invention that can be turned to military account, may not in the future be carried through to a speedy conclusion.

Let us try and picture the progress of a future war, where the main combatants are divided by a land frontier.

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Each side will have a comparatively small air force, recruited upon a regular basis. Behind these regular air forces will be reserve air forces, drawn from the commercial aviation assets of the state. The object of each side will be to place all its air forces upon a war footing as quickly as possible, and to deal its opponent a great blow from the air before he is ready. The objective of this air blow will be to reduce the resources of the enemy in military material, so that he will not have the wherewithal to wage war, and to destroy his moral even to the stage of his not wishing to wage war. The air blow will be delivered against the government arsenals, depots, communications, industries and troop concentrations by bombing them from aircraft. There are many authorities who maintain that all that is required is an air force of sufficient size to carry out such an attack in order to bring campaigns to a speedy conclusion.

There are many arguments against such an assumption. It is undoubted that destruction of life and material can be carried out on a huge scale by the air forces likely to be in existence in the future. This in itself should militate largely against lengthy wars. But, it is not to be contemplated that nations will concentrate solely on an air offensive in war, without perfecting their defensive arrangements. Gun-fire from the ground, artificial clouds, defensive fighting aircraft and dispersal of resources will render effective bombing results more and more difficult to obtain, and at ever increasing loss to the attacking bombers. An intense struggle in the air will undoubtedly ensue. Most authorities are agreed that complete supremacy in the air, such as has been obtained upon the sea in the past, is not possible of attainment, owing to the vastness of the air. But, just as there is a waning power of offensive on land, so there will be in the air. The intensity of the struggle will die down from lack of pilots and machines, and periods of stabilization at least, if not permanent stabilization, in the air will ensue. By this is meant that, though air forces will still be able to take the air on both sides, their strength will be so reduced, that neither can achieve decisive success in their offensive programme, remaining sufficient, however, to prevent each other from catching up the casualties in men and material they are suffering.

The power of modern air forces to reduce resources is undoubted, but the destruction of moral is another matter. The subject is a difficult one to discuss, since we have few data upon which to work. Undoubtedly there were panics in our great towns when air raids took place in the late war, and these air raids were infinitesimal when compared with those to be expected in future wars, but we must remember that the people had no idea of what was likely to happen. The fear of the unknown is always greater than the fear of the known. Amongst the disciplined troops, it was found that men accustomed themselves more and more to the appalling conditions of artillery and aerial bombardment during the war, and it is believed that this will also be so amongst the civilian population when once they realise that they will now have to suffer equally or perhaps more than the troops

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in the field. It is at least probable that, where there is racial hatred between the combatants, air action will have to be severe and continuous to achieve successful results against the moral of a people. No mere local lowering of moral will reduce a nation to submission, for people are wonderfully unmindful of the suffering of others. One calls to mind how troops joked when they saw their neighbours being subjected to a heavy bombardment, and the shelling of a superior headquarters was often treated as a matter for jubilation. It is conceivable that the indiscriminate killing of people in industrial areas, and such must occur in air bombing, may well influence the spirit of the people to renewed efforts, in order to conquer and punish the offenders. The only sure means of reducing the moral of a nation appears to lie in a substantial reduction of the food ration of the population. If deficiency can be created, either by destruction or the prevention of distribution to the country generally, then moral will be lowered. To achieve such a result, time is needed, for food resources in agricultural countries are more widely distributed than military resources.

But, the main argument against the termination of hostilities by air action alone is that states divided by land frontiers are unlikely to depend solely or even mainly upon air forces in war. No possible means of protecting their national existence will be neglected. They will therefore still continue to develop their land forces. Mobilization and concentration of land forces for a great blow on the land will certainly be hindered by air action, but here again defensive measures will be perfected. Reservists will not be collected in well-known barracks and retained there for long periods. Camps will be arranged for them, and these camps will assume more the form of positions in the field, against which air bombing will be less effective. Mechanical vehicles and all military resources for the land forces will be quickly withdrawn from their peace positions and distributed ready for offensive action. Every possible means of upsetting any pre-arranged peace scheme of bombing by the enemy will be adopted. Road concentration will be arranged to replace railway concentration, if such is rendered impossible through enemy air action.

A modern land army will be equipped with all the necessary adjuncts of war. It will have its own aircraft for reconnaissance, and the defence of its communications and personnel. It will have its mechanical vehicles to give it mobility. The distances such an army will cover in the future will be out of all proportion greater than those we have seen before. The German right wing advancing through Belgium and France covered 233 miles between the 13th August and the 2nd September, an average of 11 miles per day. A modern army might well be expected to double or perhaps treble this rate of progress. An invasion will therefore penetrate very quickly into the heart of a country. It may be said that the defender will have equal mobility and that he will be able to meet such an invasion with greater celerity than heretofore. But it must not be forgotten that an army suddenly thrown upon the defensive and compelled to conform to its opponent's

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movements is forced to improvise, whereas the invader follows a long pre-arranged plan of action.

An invasion on land always produces great moral effect upon the country invaded, with its hordes of refugees flying in front of it, and its cries from the local authorities of the invaded districts. A great blow on land is the best means of completing the defeat of the enemy which has been commenced by the air forces, and such blows on land will undoubtedly be contemplated in future.

The timing of the air and land blows will be arranged in a combined plan. There will be no question of two separately directed efforts having no relation one to the other. The programme of air action will be calculated to produce the best results in the time available before the launching of the land blow. The land blow will be launched at the moment considered best suited for taking advantage of the situation created by the air.

If we take the late war, we find that the Germans started their great advance about the 11th day of mobilization, practically the same day as the French. We may take it that these dates will be accelerated rather than retarded in future wars, firstly because of improved methods and the necessity for getting into field positions as quickly as possible to avoid enemy air action, and secondly, as will be explained later, because concentration will be carried out further back from the frontier for various reasons. If we allow some 2 days for the mobilization of the air forces, we then come to the conclusion that about 6 to 7 days of intense air fighting will take place. The population at large must be told what such action means, and every possible measure taken to minimize the effect upon resources and moral. These latter will consist in giving warning of coming attack, in keeping open communications and preparing to meet conflagrations and heavy casualties from bombs and gas. It is of the utmost importance that the people should not be surprised, so that panics may be avoided.

With the launching of the land blow the whole strategical aspect of affairs alters. It would be false strategy not to employ all armed forces towards the pushing on or checking of the invasion as the case may be. The invader's main objective must be to preserve the momentum of his blow at all costs. The independent air forces will be withdrawn from their distant objectives and will concentrate against those which directly forward the invasion. The enemy must be prevented from meeting the invasion, by the destruction of his communications leading to the area of invasion and the breaking up of his troop concentrations. Enemy air action against the communications of the invading army must be prevented as far as possible by defensive air fighting. As regards the defender, his main idea will be to stabilize the fighting on land, in order to bring the invasion to a standstill. All his independent air forces will be concentrated against the communications of the invader.

When large air forces are co-operating with land forces, it is important to direct their operations to the best advantage. It is considered that they will be employed generally against the communica-

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tions and rear services of the land forces rather than against the troops in front. It is unlikely that bombing or machine-gunning from the air will ever produce conditions equal to those produced by artillery and machine-gun fire from the ground in the late war, and we know that these did not stop the advance of troops in fighting formation. Air action against troops will be more expensive in casualties amongst aircraft than air action against their communications, and the results obtained against communications will be greater. Air action against troops should be confined to the attack of large bodies of troops in preparatory formations and of such targets as were presented by the Russians in 1914 in their retreat from the Masurian Lakes, and the Austrians in 1918 in their retreat from the Italian front. Just as with cavalry in the old days, air action against broken or demoraliised troops will produce enormous results.

The objectives of the various great land blows carried out in the late war were varied. The Germans intended to sweep round the French left flank, driving the French army against the Franco-German frontier in order to envelop it. They kept their eyes fixed upon the French army, ignoring the Channel Ports and Paris. The Russians intended to envelop the small German army left in East Prussia and destroy it, thus forcing the Germans to detach forces from the main theatre of war in the west.

The objective of a land army remains the same as ever—the defeat of the enemy's armed forces, but the late war has brought two new factors into prominence. Both affect the route to be chosen for offensive action on the ground.

The first is one concerning industry. Many industrial centres lie close to the frontier of possible enemies. They are tied to the fields of coal and iron, and cannot be dispersed over the country for better safety. An advance on the ground will attempt to include such enemy centres in its progress. The loss of Briey to France would have been fatal, had she not been guaranteed the import of foreign material by the British Navy. The French occupation of the Ruhr has made modern war an impossibility for Germany, unless she can secure foreign material.

The second concerns air action. Air action can only be carried out to a limited distance. Improvements in aircraft are gradually increasing their radius of action, but the greater the distance of the aerodromes from the air objectives, the less will be the effect produced by the aircraft operating from them. At present 200 miles may be considered the extreme effective distance from the objective. Modern armies, with their great mobility, will try to arrange their advance so that enemy aerodromes may be driven further into their own country, thus reducing the effect of bombing in the home country.

It is true that both the Russian and German advances in 1914 in the late war had reached a point of exhaustion, without having met intense opposing air action, but it is considered that the increased mobility of modern armies will outweigh the stopping-power exerted by

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air action and that the strength of the offensive will prevent the occurrence of such long periods of static warfare as were produced in the late war.

The defensive, and especially the strength of permanent fortifications, having decreased in power, it is interesting to consider how states will attempt to prevent invasions in future. One French writer has recommended the commencement of the framework of a defensive line along the whole N.E. front of France. He has calculated that 440,000 men would be required for its defence, and that its cost would be 2 milliards of francs at pre-war rates. The writer points out that France mobilised 3,800,000 men in 1914, and that 440,000 is only a small proportion of this number. He further says that the loss to France through the German invasion was many times greater than 2 milliards of francs. In the impoverished state of the world, no nation would contemplate such expenditure. But, quite outside the question of expense, no such linear defence can be effective in reality. It is liable to be broken at any moment by a modern offensive, when the whole system becomes useless.

All nations must, however, adopt some kind of defensive screen, behind which they can carry out their mobilization and concentration. It would appear as if the strength of the offensive and the greater mobility of modern armies will in any case force them to concentrate further back from their frontiers in order to be safe from sudden attack. There will therefore be a greater distance to cover when the advance commences, in order to reach enemy territory. This should, however, be counteracted by the greater mobility existing.

The first thing which strikes one in this question of delaying an invasion, is the power of demolitions to stop a mechanical army. For many years to come, owing to the non-commercial nature of tracked vehicles, armies will depend upon wheeled mechanical vehicles for their mobility.

Even in 1914, the Belgians slowed up the German attack on Liège to the pace of their infantry by hastily improvised demolitions. The Germans in their retreat of 1918, carried out systematic demolitions of bridges and cross roads to such a degree that mechanical wheeled vehicles were out of the question. In the advance to the Rhine, the British army was probably as short of supplies as it ever was in the war, and that when hostilities had ceased. The systematic preparation of demolitions by a nation realising its inferior power of mobilization appears to be the best solution to the problem of delaying the enemy, but there are many difficulties and objections. The geographical location of such demolitions is simple, after a general plan has been made out. There can be no question of a continuous line of demolitions all along the frontier, for it would then be equally impassable to the counter-offensive, by which alone victory can be gained. Demolitions, therefore, must be confined to certain areas, leaving others free for manœuvre. These manœuvre areas must be defended by other means, such as frontier troops upon a permanent war footing, or gas. Even

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with demolitions confined to certain areas, how will the frontier population regard the matter? Any outward and visible signs in peace-time of the abandonment of an area to the enemy will raise an outcry, and the prospect of deliberate destruction by their own authorities will be steadily opposed. There are also practical difficulties. Large quantities of explosives will be required. If maintained in a "ready" position, deterioration will be high, and the yearly turn-over to keep things ready for action will be great and consequently expensive. It might be possible to arrange for storage near the points at which the explosives are to be employed, ensuring the placing of them in position by sowing in peace-time ex-N.C.O's in small government positions in the neighbourhood, as a permanent control. There will always remain, however, the danger of individual failure through carelessness or traitorous conduct.

The next thing which strikes one is the defensive power of gas, especially of persistent gases such as mustard gas. The employment of noxious gases has been limited by international agreement, but apart from the fact that all nations are not parties to the agreement, it cannot be assumed that authorities will not adopt every conceivable measure to maintain their national existence.

Another means of preventing invasion will be by inundation. The Belgian inundations in the north undoubtedly saved the situation in what has been termed the race for the Channel Ports in the late war. In suitable country much can be done if a proper programme is thought out beforehand.

Weighing all these considerations, it is considered that, given an aggressive state such as Germany, prepared to go to any length to achieve success, a great land blow has a greater chance than ever of succeeding, through the surprise that it will create.

There is one point of considerable interest, which will require great thought in future. Up to now, all initial campaigns have been timed by states to commence in good weather, so as to gain the advantage of long days and good harvests. But, with the advent of large air forces, it is to be considered whether the land forces would not be better advised to seek the period of short days and bad weather, so as to minimize the effect of air action as much as possible. Air action will certainly be affected more adversely by bad weather than operations on land.

The next thing to consider is whether such initial blows, having broken the enemy's armed forces, will really bring hostilities to an end. Is it not possible that the enemy's country may be so broken by the force of the air-bombing and the invasion, that chaos may result? Failure in war leads to a certain overthrow of Government. If conditions become very bad, violent revolutions supervene, all authority disappears and there is no one with whom to negotiate. Guerrilla warfare may then be expected. This form of warfare is abhorred by all soldiers, and we have numerous examples of lengthy guerrilla campaigns. As a rule they depend for their success upon the inhospitability of the region in which they are waged. Spain in

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1800 was inhospitable, and the Spaniards were supported by the British Army. South Africa in 1900 was short of essential communications, if not actually inhospitable. Both countries were sparsely populated. Countries such as Germany and France could not long sustain guerrilla warfare, though Russia conceivably might do so. Still, the advent of mechanical vehicles, armoured and unarmoured, and of aircraft, has facilitated the overrunning of a country, and simplified the suppression of guerrilla warfare, except in exceptional terrain and climates. It is therefore considered that any civilized country is less likely than ever to continue a campaign after its armed forces have been scattered.

The argument has been advanced that air action will so reduce the resources on both sides, that land armies will not be equipped with all their necessary modern adjuncts, that offensive weapons and ammunition will be so scarce that the defence will again have the upper hand, and that mobility will disappear. If the will to fight still exists under such conditions, then wars may indeed become a stalemate between two exhausted opponents. We shall have gone back to the condition of the Hundred Years' War. Is such a picture possible with the certainty that some manufacturing countries will be left out of the struggle, and that they will be available to supply one or other or both of the combatants with their military needs?

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THE SLIDE RULE IN THE FIELD.

By BT. LIEUT.-COL. E. C. ANSTEY, D.S.O., R.A.

THE suggestion that the slide rule should be used for the solution of gunnery problems in the field is not a new one. It is referred to in Field Artillery Training and has been practised by some officers both in war and peace. But owing to the undeserved reputation for difficulty the instrument possesses, its appreciation is not widespread. A few days' experience at drill and practice camp would dissipate such false ideas, I am confident, in the minds of most of those who hold them and would demonstrate the superiority of the slide rule over rules of thumb, mental or paper calculations and references to logarithm or other tables. The superiority in rapidity and convenience is most marked in wet or windy weather, while the accuracy of the results obtained is sufficient for our requirements with certain exceptions noted below.

The slide rule proves of value in the solution of the following calculations :—

(a) The distance OB by the angular measurement of a sub-base.
(b) Conversion of metres to yards.
(c) The angle of sight from B to T when difference of height is known.
(d) The range to a target indicated by an aeroplane by the Very light method.
(e) The range and bearing of a target when the co-ordinates of battery and target are known.

The triangle TOB of which two sides and the included angle are known can not be solved by the 10″ slide rule so simply and quickly as by means of the plotter.

The 10″ slide rule in its case can be carried without inconvenience in a haversack and is recommended as preferable to a shorter one. It is, of course, considerably more accurate.

There is, however, on the market a substitute for the 10″ rule produced by Lieut.-Col. N. M. McLeod, R.F.A., which many officers may find easier to work with. It is remarkably portable, measuring only $4\frac{1}{2}$″ long by $1\frac{3}{8}$″ in width and can be carried in a field glass case. Although it is not quite so accurate as the 10″ rule, it appears suffi-

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ciently so for artillery purposes and performs certain calculations which are outside the scope of its big rival :—namely, the calculation of the deflection-elevation factor in OT ranging, and that of the angle of sight in metres as well as in feet with one setting. Its greatest advantage lies in a double line scale it possesses designed to facilitate the solution of the T.O.B. problem. It is claimed that by means of this rule the T.O.B. triangle can be solved quicker than by using the plotter while the battery angle of sight is given with the same setting. To allow the reader to judge for himself of their respective advantages the working out of the same problems are described below for each instrument.

The method of finding the distance OB by means of a sub-base is as follows. If the sub-base put out is 50 yards and its angular measurement from the OP is 5 30′, the slide is pulled out to the right and the rule turned over, the angle 5 30′ being set on the sine scale against the upper mark in the notch of the rule. It will be noticed that the sine scale for small angles is large enough to allow accurate setting to 5 minutes or rough setting to 1 minute. The rule is turned over again and above 50 on the slide is read 521 on the rule. Calculation by logarithms gives the answer as 519·3 yards. The discrepancy is due to the slide rule calculating the sine instead of the tangent of the angle.

Before we disturb this setting of the slide rule there is an important point to notice. The answer can be read simultaneously for any sub-base, the sub-base being set to an accuracy of ·2 of a yard between 10 and 20 yards; of ·5 of a yard between 20 and 50; and of a yard between 50 and 96. This is of great practical value. The sub-base need not be exactly 50 yards. If trees or bushes obscure the flag at 50 yards, it can be planted at 47 yards, say, and "sub-base 47" signalled up. The B.C. without any further setting reads off the distance OB then as being not 521 but 490 (490 on the upper scale of the rule being found over 47 on the upper scale of the slide). A miscalculation of 30 yards in the sub-base when OT is 4000 and T.O.B. is 137° causes a variation in the range of BT of about 300 yards. This reminds us of the importance of accuracy in these calculations.

It will be seen that the setting and reading of the slide rule in this case are very simple. If a reader who is unaccustomed to the handling of the instrument will test himself he will find that it is easy to read off the answer within 15 to 20 seconds of the angular measurement of the sub-base being given him. A few minutes' instruction serve to make a B.C's assistant proficient.

Metres can be converted to yards with fair accuracy, that is to say to the nearest 10 yards at all ranges. The scale in Range Tables Part II is so easy for reference that it is not worth using the slide rule except under bad weather conditions or when the problem occurs in the midst of other calculations and the rule is handy while the tables are not. From the tables it will be seen that 8000 metres are equivalent to 8749 yards. If 8750 on the lower scale of the slide is

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set over 8000 on the lower scale of the rule, the lower scale of the slide will read yards while the lower scale of the rule reads metres. If the 8750 and 8000 on their respective scales are marked in red there is no danger of forgetting the correct setting. A comparison between the range tables and the slide rule set as above will show that it is not difficult to read to within about 10 yards at ranges over 4000; to the nearest 5 yards at ranges between 2000 and 4000; and to the nearest yard between 1000 and 2000.

The angle of sight between two points of which the heights are known can be found with two settings of the slide rule. Supposing this difference is 150 feet and the points are 4600 yards apart. It is necessary first to find what slope a rise or fall of 150 feet in 4600 yards is equivalent to and then to discover the angle of such a slope. It is generally easier to reduce a small number of feet to yards than to convert a large number of yards to feet. In the above instance we therefore place 4600 on the upper scale of the slide under 50 on the upper scale of the rule and notice that the right hand 1 of the upper scale of the rule is over 92 on the upper scale of the slide. This indicates that the required slope is 1/92. It makes no difference to this reading of course if we prefer to convert the range to feet and place 13800 under 150. Now slide the cursor to the right hand 92 on the upper scale of the rule, pull the slide completely out, turn it over and reinsert it until the little mark just to the left of 2 degrees on the sine scale is under the cursor, i.e., under 92 on the upper scale of the rule. Turn the rule over and the upper mark in the right hand notch will be found opposite $37\frac{1}{2}$ on the slide. The answer is therefore $37\frac{1}{2}$ minutes. Although this may sound complicated it will be found that the process can be completed without difficulty in 30 seconds. If the map is marked in metres instead of feet the difference of height must of course be converted before the slide rule can be set.

This problem can be solved much more quickly and simply by means of Lieut.-Colonel McLeod's rule. Moreover with his rule it is immaterial whether the difference in height is given in metres or feet. Only one setting is required in either case and the answer can be read in less than 10 seconds.

The next problem for solution by the 10″ rule is the calculation of the range BT from the angular observation of an aeroplane flying vertically over the target at a known height, i.e. an aeroplane employing the Very light method of indicating the target. The first step is to convert into yards the height of the aeroplane as reported in feet. We will assume this height to be 720 yards and the angle of sight of the aeroplane when vertically over the target to be 8°. Turn the rule over and pull the slide out to the left until 8° on the tangent scale is over the mark in the left hand notch. Turn the rule over again and under 720 on the lower scale of the slide will be read 5125 on the lower scale of the rule. The range BT is therefore 5125 yards. Calculation by logarithms gives the result as 5123 yards. It will be

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observed that the angle can be set accurately to 5 minutes and approximately to 1 minute. The data for the above calculation are the same as those used by Lieut.-Colonel McLeod in the explanatory pamphlet of his slide rule, which solves the problem equally quickly if not so accurately. The McLeod rule may indeed be quicker for, when the height of the aeroplane is greater than 3000 feet, a second setting, of a simple form it is true, becomes necessary with the 10″ rule. For instance, if the slide is pulled out to the left until the 18° on the tangent scale is opposite the mark in the notch, it will be seen that the figure 2 (representing 2000 yards or 6000 feet) on the lower scale of the slide is out of the rule and against no figure. The cursor must then be run to the point marked by the right hand 1 of the slide and the slide moved to the right until the left hand 1 of the slide comes under the cursor. Under the 2 on the lower scale of the slide can now be read 6150 on the lower scale of the rule, i.e. the range BT is 6150 yards. Logarithmic calculation gives the answer as 6155. The McLeod rule reads about 6200. Theoretically it should read the same but being half the scale it is liable to double the error. A little more care in the marking of the divisions is required.

One of the disadvantages of the 10″ rule is that there are three different methods of finding the tangents of angles dependent on the size of angles. Slopes of 1/1 to 1/10; 1/10 to 1/35; and 1/35 to 1/1000 are each dealt with in a different way. Strips are obtainable for pasting on the back of the slide rule that give these different methods. But the fact does not make the rule easier to use.

The great advantage possessed by the McLeod rule over the 10″ slide rule when solving the battery angle of sight has already been noted. It can be used in the same way as its elder brother for the calculation of OB by the sub-base and has the same advantage of giving readings simultaneously for any sub-base between 25 yards and 100 or more. The 10″ rule gives readings for sub-bases down to 10 yards instead of 25 it is true. But the scope of the McLeod rule is sufficient for practical use. Owing to its small size it is not quite so accurate as the 10″ rule. In the example given earlier in this paper in which the 10″ rule gave an answer of 521 yards and logarithms showed the true answer to be 519·3 yards, the McLeod rule reads about 526. As the base can be set on the plotter to the nearest 25 yards only, or at most to the nearest 10 yards with any accuracy, the result given by the McLeod is good enough. The limitation of the McLeod rule however is that it cannot be used, so far as I can see, for angles of less than $2\frac{1}{2}$ degrees. This means that it cannot solve the problem when a 25 yard base is used at a distance less than 580 yards.

Finally comes the problem of calculating the range and bearing of the target when the co-ordinates of battery and target are known. If we take the example given on page 283 of F.A.T., Vol. II (1920), we see that the difference of northings is 9500 and of eastings 8300. This arithmetical calculation must be made before the slide rule can be set.

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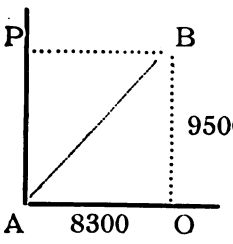

The slide rule gives the tangents of angles less than 45°. We must therefore calculate for whichever of the angles in the triangle ABO is less than 45°. Inspection shows in this case that ABO must be less than BAO and it so happens that the angle ABO which equals the angle PAB is the angle we wish to know. Set 83 on the lower scale of the slide over 95 on the lower scale of the rule. As the slide is now pulled out to the right the tangent scale cannot be read when the rule is turned over. Run the cursor therefore over the left hand 1 of the slide and push the slide through to the left until the right hand 1 on the slide is under the cursor. Turn the rule over and in the notch will be read on the tangent scale the angle 41° 10′. Calculation from tables gives the answer as 41° 9′. To find the range from the formula $\frac{8300}{AB}$ = Sin 41° 9′, turn the rule over, pull out the slide and set the sine scale to 41° 10′ in the notch and over 83 on the upper scale of the slide will be found 126 on the upper scale of the rule. The range is therefore 12600. It will be observed that this result is only approximate as the sine scale does not read accurately to minutes.

I must apologise to Lieut.-Colonel McLeod if I am understating the capabilities of his rule, but it appears to me that it does not solve this problem satisfactorily. It does not read to 12600 but for field artillery that is of course at present unnecessary. If we halve the above co-ordinates however and say the differences of northings and eastings are 4750 and 4150 respectively, the angle from grid north is still 41° 10′ and the range becomes 6300. But if I have set Lieut.-Colonel McLeod's rule correctly I find it reads approximately 5850.*

It may be argued that if the situation is such that co-ordinates are being dealt with, time is available and the accuracy of careful calculation is desirable. But when a target is indicated by an aeroplane by the co-ordinate method, the position of the battery has probably been fixed roughly by the B.C. and not by a survey officer, and the air observer does not claim great accuracy for his estimate of the position of the target. Rapidity is of greater importance than great accuracy and the Air Force is satisfied if the first salvo falls within 500 yards of the target to give them a fair chance of seeing it. In such cases the slide rule offers a readier and simpler method of calculation than logarithmic tables.

A circular slide rule exists but is not adapted for all the problems confronting the gunner and it cannot be recommended. It appears therefore that if the artillery officer wishes to use a slide rule his choice must lie between the 10″ rule and Lieut.-Colonel McLeod's. The

* Lt.-Col. McLeod informs me that this is not the way to treat the problem with his slide rule. It should be solved as a TOB problem, and though the small scale will not admit of an accurate reading, an approximate answer is quite easily obtained.

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latter has great advantages. It is extremely portable and handy. It solves with reasonable accuracy the TOB triangle, and battery angle of sight, with one setting; it calculates the angle of sight from differences in V.I. on the map; and solves the sub-base and Very light calculations. A simple setting shows the varying gun ranges for the different howitzer charges. Finally it provides the combined factor for ranging along the line OT. The 10″ slide rule performs all of the above except the last two but of course performs them more accurately. It is bulky however in comparison to the McLeod rule though not too bulky to be carried in the haversack. Those familiar with it will probably prefer to remain faithful to it. Those unfamiliar with it may find its rival more to their liking. Both rules may be obtained from Steward & Co., in the Strand, the cost of the McLeod rule being 14/6 and includes a little pamphlet which explains its working very clearly.

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LIAO-YANG AND THE MARNE.

By MAJOR A. F. LAMBERT, M.C., R.F.A.

NOTHING is more irritating to the reader of a novel than to come across some petty mistake on the part of the writer as to fact or custom. It puts him on the alert for further blunders and, if he finds them in the course of his reading, may cause him to throw aside a book which has merits in most respects. The same holds good for military history with this difference; that the irritation caused by the error as to fact may lead, not to throwing the book away, but to excavations in weighty histories to discover exactly what did happen and why.

Such, anyhow, was the effect on a reader of an article in the Journal for February, "A Manœuvre of Kuroki," by Reginald Kann, translated from the French *Revue Militaire Générale*.

The writer of this article compares the action of Kuroki at Liao-Yang and Von Kluck at the Marne. Both aimed a detachment at the enemy's left flank and in so doing left a considerable gap between the detachment and the main body. This risky manœuvre was attended with success at Liao-Yang and failure at the Marne. The article goes on to draw conclusions as to the reasons for the difference in result.

The statements which lead up to these conclusions, however, in some cases do not bear examination, and it may prove of interest to readers of the article under discussion to reconsider the two manœuvres in the light of such facts as can be gleaned from existing literature on the subject.

First it will be necessary to attempt a "fair and true summary" of "A Manœuvre of Kuroki." The writer's contentions are as follows:—On August 29th, 1904, the Japanese armies were in contact with the Russian main position south of Liao-Yang. They had discovered that a purely frontal attack would be costly, and determined to turn the enemy's left. To do so they detached two of Kuroki's three divisions north of the Taitzu-ho leaving a gap of 9 miles in their battle front absolutely undefended. Kuropatkin, the Russian commander, had every chance of pushing through this gap, but did not grasp his opportunity through preoccupation as to the threat by the Japanese detachment to his L. of C. Counter attack by the Russians on Kuroki's detachment north of the Taitzu-ho failed to dislodge it, and Kuropatkin retreated towards Mukden.

Turning to the Marne: In September, 1914, the German army was opposed, south of the river to the B.E.F. and the greater part of the French 5th Army. Von Kluck, the Commander of the German right army, finding himself attacked in flank by the French 6th Army

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(Maunoury) on the Ourcq, withdrew the whole of his army in an attempt to outflank Maunoury. By so doing he left a gap of 25 miles in the German battle front, covered only by cavalry. The allies pushed back this force, and penetrated between Von Kluck and Von Bulow (on his left) before the former's outflanking movement against Maunoury could take effect, and thereby caused the retirement of the whole German line.

The foregoing leads him to the following conclusions. Kuroki calculated the chances of success; he aimed his outflanking movement at a vital point, the Russian L. of C., and aided by Kuropatkin's vaccillation achieved success.

Von Kluck was guided by a theoretical principle, namely that action against the enemy's flanks alone procures success, and did not calculate the risk. He aimed his outflanking movement at a non-vital point, the flank of Maunoury's army, and further he was not assisted by inaction on the part of the enemy opposite the gap. Therefore he failed.

Now the version of Liao-Yang given above is, in some important respects, entirely at variance with the facts as given in the official histories of this war, both British and German. It is interesting to seek in those histories the answers to these questions :—

(a) Why did Kuroki cross the Taitzu-ho on August 30th?
(b) Why did not Kuropatkin counter attack through the gap caused by this movement?
(c) Why did Kuroki's detachment, though greatly inferior in numbers and guns to the Russians on its front, bring about the retreat of the Russian Army?

The narrative is as follows :—

The Japanese advance towards Liao-Yang was carried out by converging routes. On August 26th the right army (Kuroki) attacked the Russians opposed to him east of the Tan-ho.

On August 27th the latter retired towards what was known as the Liao-Yang advanced position; bodies further west conformed. This had the result of allowing the three Japanese armies to gain touch.

This retirement left Japanese G.H.Q. in doubt as to whether the Russians intended to fight on the "advanced position," or retire. A general directive to the army commanders was accordingly issued providing on the one hand for a concentric advance on the position south of the Taitzu-ho, and, on the other, for the transfer of Kuroki's army north of that river should the Russians decline battle.

On August 30th the frontal attack on the advanced position was in full swing with heavy Japanese losses and small gains to show. Of Kuroki's army, however, only $1\frac{1}{2}$ divisions, the Guards and a brigade of the 2nd were engaged. The remaining brigade of the 2nd and the 12th division were confronted by the Russian XVII Corps, but between them lay the Taitzu-ho. This river is broad, deep and fairly rapid; the Japanese bridged it higher up with 34 pontoons; the German account gives it an average width of about 200 yards. On the stretch which covered the front of the XVII Corps it breaks up into subsidiary

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channels, but, judging by the map, the islands formed are marshy, as are both banks. Approaches fit for transport appear to be non-existent. and, in addition, the valley at this time of year was covered with high crops of kao-liang, a millet which grows to some ten feet. In other words the Taitzu valley here is a most serious military obstacle and the forces facing each other across it were unable to come to grips.

As already stated, the frontal attack was now (August 30th) in full swing, but in the heat of the action Kuroki, whose headquarters were near the 12th Division, received information from the Guards division to the effect that the Russians were retreating. He ordered the 12th Division to cross the Taitzu-ho that night (30th/31st) followed by a brigade of the 2nd division. Whether he did so entirely on this information appears open to some doubt. The German account is confident on the point, the British more guarded. A "very well-informed staff officer" told Sir Ian Hamilton[1] that he had seen with his own eyes the enemy falling back on Liao-Yang on the 30th: Kodama, the Japanese chief of staff, later, gave the 31st as the date on which Kuropatkin determined to retreat. Kuropatkin himself apparently gives September 3rd. However this may be, one thing is clear; when Kuroki crossed the Taitzu-ho the Russians were not retiring, and all evidence points to his having taken this decision as a result of incorrect intelligence. It is just conceivable that he, personally, wished for an excuse to get at the Russian flank by crossing the Taitzu-ho, and used this faulty intelligence as a variant of Nelson's blind eye at Copenhagen; but there does not seem to be the slightest foundation for such a supposition.

August 31st saw Kuroki and his $1\frac{1}{2}$ divisions safely across the Taitzu-ho, where he was left almost unmolested to improve his position and prepare for an advance westwards towards Kuropatkin's communications. The measures taken by the Russian cavalry to impede him are an astonishing story of ineptitude but do not bear directly on the matter in hand. What does concern us is that Kuropatkin soon heard of the crossing and the consequent anxiety for his communications began to prey on his mind.

Meanwhile the gap referred to in M. Kann's article had been opened, but not to the full extent of the distance between the inner flanks of the divided Japanese forces. A large portion of this gap was covered by the obstacle of the Taitzu-ho, which precluded an opportunist counter-attack by the XVII Corps in position north of the river. A gap through which counter-attack was practicable did exist however, namely between the right of the Japanese southern forces and a point on the river north of that flank, a distance of about three miles. A counter-attack in this direction would have directly threatened Kuroki's communications and might have isolated him north of the river.

This became apparent early on the 31st to General Vasilef commanding the Russian forces immediately south of the Taitzu-ho.

[1] A Staff Officer's Scrap Book Vol. II.

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To such an extent did he realize the situation that he set troops in motion preparatory to a local counter-attack. It was now that fortune definitely deserted the arms of Russia, for Vasilef "referred the matter to higher authority."

Kuropatkin had foreseen and feared a movement north of the river against his communications. His plan for meeting it was by direct counter-attack against the outflanking force, and not by the indirect method of applying pressure south of the Taitzu-ho. The possibilities of these alternatives provide an interesting study. For the purposes of the present discussion it suffices that Kuropatkin had a plan, and moreover, one that if successful, would give him a much needed partial victory over the Japanese. To gather a force for this counter-attack on Kuroki he put into execution a plan, already provisionally issued to commanders, for withdrawing to the Liao-Yang bridge-head and transferring the forces thus economised to the north bank of the river. Therefore Vasilef's proposal, when it reached him, met with a prompt veto. The retirement took place on the night of August 31st/September 1st. The golden opportunity for the Russians had passed; the crisis for the Japanese was over.

Kuroki meanwhile had advanced westwards and completed his preparations for taking a line of hills running north and south through a plain covered with a tangle of kao-liang crops, and from which the road and railway forming Kuropatkin's L. of C. could be seen at a distance of some 7 miles.

The story of the succeeding days is one of attack and counter-attack on this ridge; dogged tenacity on the part of the Japanese; un-coordinated and piecemeal attacks by the Russians; finally the defeat of the Russian commander's morale and the withdrawal of his army in good order towards Mukden.

We set out to find answers to three questions. The narrative above supplies them.

First. Why did Kuroki cross the Taitzu-ho on August 30th? Because of incorrect intelligence and not, as M. Kann states in his article, because he had calculated the chances of success and its attendant risks.

Second. Why did not Kuropatkin counter-attack through the 9 mile gap opened by his opponent? Because the greater part of the gap was impracticable for counter-attack by reason of the presence of the Taitzu-ho. In the Marne area where roads were plentiful and many bridges intact, no such obstacle existed. It cannot be denied that a gap, south of the Taitzu-ho did exist, but Kuropatkin had already made up his mind to counter any flanking movement north of the river by direct methods. His dispositions allowed of the concentration of immensely superior force of numbers and material at the decisive time and place. Had the factors of moral and training been absent, as in a war game, his action would certainly have been accounted to him for victory. History has dealt hardly with Kuropatkin for his shortcomings in this campaign. It is hardly fair to add to them by exaggerating the opportunities that he missed.

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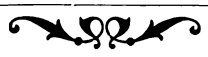
Last. Why did Kuroki's detachment, though greatly inferior in numbers and guns to the Russians on its front, bring about the retreat of the Russian army? Because the superior training, morale and leadership of the troops, and the determination of their commander enabled them to hold on long enough for the Russian commander to lose his nerve. It was the commander who was defeated, more than his army. Kuropatkin insisted later that there were three or four divisions of Japanese not yet engaged. A simile may be found in the game of poker.

The foregoing disposes, to a large extent, of the similarity between the actions of Kuroki and Von Kluck. Both created a gap in their line in face of the enemy; both did so under a misapprehension, the former that the Russians were retiring, the latter that the B.E.F. was too disorganized to constitute an immediate danger.

And here the similarity ends. The topography of the gaps is entirely unlike, and, at the times under discussion, Kuroki was the attacker, Von Kluck the attacked. If we are to draw a lesson from "A Manœuvre of Kuroki" it must be that analogies between battles carried too far are dangerous, and still more so if facts are distorted in the process.

It would serve just as useful a purpose to compare the actions of the Germans and the Russians in these battles. Both were attacked in flank. Both countered directly instead of by pressure applied to another part of the line: both failed. And to draw from this the conclusion that "the German theory that action against the enemy's flanks alone procures success," a theory to which M. Kann imputes Von Kluck's failure, is after all correct!



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A SIMPLIFIED METHOD OF LAYING.

By MAJOR W. E. MAITLAND DOUGALL, D.S.O., M.C., R.F.A.

IT is suggested that the control of a battery in action is much facilitated if the errors of individual guns can be eliminated. Put in other words, this means the fulfilment of the two following conditions :—

(i) That all guns shall throw their shells the same distance when they have the same range on their range drums.

(ii) That all guns in the battery shall have the same angle on their dial sight when they are shooting parallel.

The first of these conditions is now fulfilled by the M.V. corrector scale.

The second could be fulfilled by the introduction of a correction scale on the dial sight. This would be, as far as principle is concerned, an exact counterpart of the M.V. corrector scale. What the M.V. corrector scale does for range, the proposed scale would do for line.

Such a scale would not be the additional complication which at first sight it may appear. On the contrary it would make things very much simpler for all concerned. To prove these assertions we must consider what actually happens.

The guns in a battery obtain their line either from an aiming point or by receiving an individual angle from the director (A.T. Vol. II, page 43).

The G.P.O. gives, say, "All guns 80° right," and then perhaps "Distribute 30 minutes from No. 1."

The B.C. now "shoots in" for line, and, in doing so, will almost certainly have to give a few small corrections for line.

The angles from the aiming point will now be, let us say :—

No. 4	No. 3	No. 2	No. 1
78° 20′ right	78° 55′ right	79° 10′ right	80° right

Actually, however, the situation is not so simple, for the guns have probably picked up auxiliary aiming points, in which case the readings on their sights may be absolutely anything. If the guns obtained their line by means of an individual angle from the director, this trouble is bound to arise for the use of auxiliary aiming points is then essential.

The B.C. now gives "Record as zero lines" which makes things more involved, for the guns then have to record their angles off two different points. The matter can, in a way, be simplified by planting aiming posts on the zero line, but the objections to this will be stated later.

The guns are now on "zero lines" but, as has been shown, the angles on the dial sights are anything but zero. Consequently,

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when a target appears and the B.C. orders, let us say, "All guns 13° 30′ left of zero lines," each No. 1 has a distinctly difficult task to perform; he will have to put 13° 30′ more left on to a sight that is at present reading, say, 81° 15′ right. Moreover, if he makes a mistake he can get no help from anyone else; it is quite impossible for the Section Commander, in addition to his other duties, to keep an accurate record of the angles on the dial sights of two guns under such conditions.

Owing to these difficulties it is no unusual thing, even in a Regular battery, to hear people say that the guns were not "holding their lines well" or "were not answering the helm." Where the discrepancy exceeds the 100% breadth zone of the gun, this simply means that a mistake has been made. Moreover such mistakes are seldom traced and the delinquent continually escapes—which is a very bad thing.

We are told that the main faults at practice camps include :—

(a) *By the G.P.O.*—Bad laying out of lines of fire.
(b) *By Section Commanders.*—Failure to check the lines of their guns.
(c) *By Nos. 1 and layers.*—Bad switching.

This seems to suggest that each respective rank is unavoidably failing to carry out its duties as far as line is concerned.

All the above faults occur year after year; they are not in any way new faults. The truth surely is that they always will occur until the system is simplified. It is suggested that line is a matter which has been allowed to grow complicated. How else is it that Artillery Training finds it necessary to devote more space to line than it does to the relatively complicated subject of range with its curved trajectory.

With a correction scale the whole thing is greatly simplified.

This correction scale would simply be a revolving plate, similar to that on a director, allowing the sight to be rotated without registering an angle.

It would not be graduated except for a mark to enable it to be set at zero exactly as in the case of the director.

When "Record as zero lines" was ordered, all dial sights would be set at zero and relayed on the aiming point (without moving the gun) by means of the correction plate.

The sight need not necessarily be relaid on the original aiming point. Any suitable aiming mark can be picked up by simply turning the correction plate. This does not disturb the line of the gun or the reading on the dial sight, so there is no difficulty in changing the aiming mark at any time. A mere change of aiming mark under these conditions will not alter the angles used by the gun or its registrations.

A target now appears. The B.C. simply orders "All guns 13° 30′ left of zero" and this angle is put on the sights. The Nos. 1 have no complicated task to perform, no addition or subtraction.

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The chances of a mistake are therefore negligible. Besides, if one No. 1 does get wrong, he can ask the next gun what the angle should be (for they are all using the same angle). Again, the Section Commander can check the line of one of his guns against the other.

If a gun is thrown off its line, it simply relays. If its aiming point disappears, a new one is picked up. If the sight reading is altered and forgotten, it can be obtained from the next gun.

However, just in case two of these misfortunes might befall the gun simultaneously, it is well to plant aiming posts, when time permits, on the actual zero line. If aiming posts are planted like this no combination of these misfortunes can really matter, for one can always set the correction plate back to its zero mark and lay on the aiming posts.

With the proposed system therefore there is no need whatever for lines to be recorded off two different points and chalked on the gun, and so on, as is done at present.

When aiming posts are used as above, simply as a check, they are very useful, for they make it unnecessary to record, that is to write down any angle.

If on the other hand they are used for more than this, it becomes necessary to note the line off two points and to record, to take, in fact, the precautions which are taken now.

Again, it is little use getting a really accurate line by survey methods if we habitually lay on such relatively inaccurate things as aiming posts. A distant church spire is a far better aiming mark.

In addition aiming posts are very liable to be blown down or knocked down, especially now that they have cross pieces on them, and it is undesirable therefore that they should be one's "first string" in the matter of line.

Everything in fact points to their being used only as a check, or, perhaps, with a light on them, for night work.

For greater accuracy in night shooting, one can use a light on a battery picket considerably further from the guns than the aiming post light would be. In this case, the guns merely turn their correction plates until the battery picket is picked up—in fact they change their aiming point in the way that has already been explained.

Then here is another point.

One may sometimes be shooting with one gun or a section and then want more guns to join in. This is the usual thing, for instance, in a "Danger shoot"; or one might be registering a zone with one gun when a fleeting target appears on or about the same line; or one section may be required to join in again with the battery after completing some special task.

The practice of giving parallel lines to a named gun is, therefore, in many cases very useful, and is only in disrepute because of the complication at present involved.

With the proposed methods all that is necessary is for the No .1 of the named gun to call out his angle and the other guns simply put this angle on and lay on their own aiming points.

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If the proposed plate were used in conjunction with a dial sight that read from 0 to 360°, it would be possible to orient the dial sight on grid north by means of the correction plate. One could then simply give grid bearings which each gun would put straight on its sight, no matter what aiming point it might happen to be using. In this case, one's Artillery board or map would, of course, be made to read grid bearings.

It will be seen that the idea set out above consists really of a simplified procedure made possible by a modification of the dial sight. When "Record as zero lines" is ordered dial sights are set at zero and then rotated by means of the correction plate on to any suitable aiming point.

The advantages claimed for this procedure are briefly :—

1. Individual gun errors for line are eliminated; in other words the guns use a common angle both by day and night. This makes laying for line a much simpler and therefore quicker business than it is at present. Mistakes in line, at present very common, should be almost eliminated, and even if they occur they would be much more easily discovered, and also much more easily corrected, which is important.
2. The so-called zero line really becomes a zero line. This means that in switching on to a new target the angle is put straight on the sight without having to be added to or deducted from some other angle. This saves the No. 1 and layer from the most difficult task they are at present called upon to perform in action.
3. Each gun can use the aiming point which suits it best, and, if this is knocked down, or obscured, can easily change to another.
4. Parallel lines to a named gun becomes an easy matter; this also means that it is easy to get a gun back on the line if it gets wrong.
5. The introduction of survey methods enables one in favourable conditions to work to such a degree of accuracy that the greatest inaccuracies occur in the battery itself. The habitual use of a really clear-cut distant aiming point and the disuse of aiming posts except as an emergency measure makes for greater accuracy in what is therefore apt to be the weakest link in the chain of accuracy.
6. Recording can be abolished.

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AN INCIDENT IN THE CRIMEA REVIVED.

THE 18-PRS. AT INKERMAN, OCTOBER, 1854.

LIEUT.-COL C. DICKSON, VC, AND LIEUT. C. H. OWEN, R.A.

A WORD of explanation seems necessary when presenting this somewhat belated but very interesting note of a famous achievement by one of the chief actors, who relates it with the modesty which was characteristic of him.

When the Memorial erected on Woolwich Common to the honour of those famous Gunners, father and son, Sir Alexander and Sir Collingwood Dickson, was unveiled by Lord Roberts on 10th June, 1912, with the solemnity befitting the occasion, the late Maj.-Genl. C. H. Owen, then 82, was present to shew the respect he had for his old chief. A full account of the ceremony appeared in the R.A.I. Leaflet of July, 1912, and General Owen, who had not spoken at the ceremony, thought it might be of interest if he were to supplement from personal knowledge on the spot, the details mentioned by Lord Roberts in his speech, so far as they concerned the achievements of Sir C. Dickson which gained him the VC. Unfortunately, owing to pressure of space the undermentioned "Reminiscence" got crowded out, but has now come to light amongst the voluminous correspondence in the "R.A. Memorials" chest, and has been sent me by Col. Boileau to deal with because I had the privilege of writing the "Appreciation" on General Owen in the "News" of December, 1921. The dear old General was, I fear, disappointed that room could not later be found in the "Leaflet" for his remarks, but now that it has turned up unexpectedly it would seem a pity if this fine old soldier's wish to have his tribute to Sir C. Dickson recorded should not be posthumously gratified.

In his letter to Col. Boileau of 25th July, 1912, he says :—

"Neither I nor Dickson had anything to do with getting the powder wagon up. What he directed me to do when I reached the hill with the second relief—behind the '21 Gun Battery' where the wagon was left—was to *unload it*, which took some time, under heavy fire in the open, and which I continued to do till it was blown up by a shell; two horses were killed by a round shot and one gunner had his head taken off by a round shot. Dickson went up to the battery and left me to do the job."

Owen purposely mentions this in his printed "Reminiscence" because he says "I only did what I was ordered to do. C. Dickson

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behaved so well during the bombardment that we were all glad he got the VC. . . . . Dickson came out to the Crimea as interpreter on the Staff as he had been an instructor in the Turkish Army and knew their language, but when the siege began he was appointed to the command of the 'Right Attack.' "

General Owen's correspondence with the then Secretary R.A.I. and Col. Boileau has been sent to me by the latter, and I propose later to pass it on to the present Secretary to file as a record, because Owen's letters are fuller than I have quoted and are historical and worth preserving.

I believe I am right in saying that General Owen was probably the only R.A. Regimental officer who served throughout the siege "from find to finish."

December, 1923. J. C. DALTON.

A Reminiscence of General Sir Collingwood Dickson, V.C., G.C.B., in the Crimea.

By THE LATE MAJOR-GENERAL C. H. OWEN, R.A.

AS I was the only officer present at the unveiling of the Memorial to Sir Alexander and Sir Collingwood Dickson at Woolwich, on the 10th June, who had served with the latter in the Right Attack Siege Train before Sebastopol, I may perhaps be allowed to add a few words to what Lord Roberts said respecting him.

What those who served under Sir Collingwood Dickson appreciated so much in him was, his wonderful coolness under fire, his constant presence with us in battery, and his cheery behaviour in action and in camp. He was the life and soul of the R.A. of the Right Attack and interested himself in everything connected with the efficient working of the ordnance and the health and comfort of the companies during that severe winter of 1854-5, in the same way as Capt. Peel, R.N., with the sailors. For instance, he established a common kitchen for all these companies, when the only fuel to be obtained consisted of the roots of the brushwood with which the plateau was covered, and these had to be dug up by the gunners when off duty, and were all brought to the common kitchen, and the cooking was done there, thus regulating the supply and preventing waste of fuel. A cup of hot coffee was given to each man before the reliefs marched off for twelve hours' duty in battery, often before daylight, and when the ground was covered by deep snow.

Lieut.-Colonel C. Dickson took an important part in the battle of Inkerman; he, with Captain D'Aguilar, brought up from the Right

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Attack Park the two 18-pr. position guns which were actively engaged that day. Lieut.-Colonel Gambier, who commanded the Siege Train, had these two guns, on the morning of the 5th November, prepared for action, with ammunition, stores and man-harness, as there were no horses provided for the Siege Train; and he started with them on receiving Lord Raglan's order, but was wounded by a spent round shot near the Windmill, when the command of the guns and detachments devolved on Lieut.-Colonel C. Dickson. The gunners were taken from the 6th and 7th Companies of the 11th Battalion. One of the guns was pulled up to Inkerman by gunners with man-harness, the other got help from two field battery teams.

The fire of these guns produced disastrous effects on the Russian artillery, dismounting guns, damaging carriages, and knocking over horses and men. Prince Menschikoff, in his dispatch, partly attributed his defeat to the English having placed their siege artillery in position; they were not siege guns, but the destruction they caused led the Russians to think they were siege pieces. The latter concentrated the fire of their artillery on them, and the losses in the detachments who worked the two guns were very heavy.

Lord Raglan in a dispatch of 11th November, 1854, wrote:—"I have great pleasure in speaking in terms of high panegyric of Lieut.-Colonel Dickson, who had charge of these guns, Captain D'Aguilar, and the officers and men who worked them. They performed under Lieut.-Colonel Dickson's directions, the most effective service, notwithstanding that they had a very heavy fire upon them, and that their loss in consequence was very severe, seventeen men having been either killed or wounded, and one officer wounded." [1]

[1] "Artillery operations before Sebastopol" (p. 29)—*Major Reilly.*

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Nth (BLANKSHIRE YEOMANRY) BRIGADE, R.F.A.

By CAPTAIN O. T. FRITH, R.F.A.

1. Introduction.

THE post war reduction of Yeomanry Regiments has added some 13 "Yeomanry" Brigades R.F.A. to the Army List. At the same time a number of factors have tended to increase the importance of the Territorial Army.

The abandonment of our supreme position on the sea combined with our comparative weakness in the air, throws a greater potential responsibility on the land forces; the reduction of the available regular army at home to two divisions passes on a tremendous responsibility to the Territorials, should urgent need arise. The fact that the Territorial Army "made good" in the early years of the great war may have contributed to the above decisions, and it would appear that even more will be expected of them in the case of another emergency.

Furthermore it must be remembered that the Territorial Army is a cheap form of army, and as such is bound to attract the attention of the Government of any country as heavily in debt as ourselves. The following notes may be of interest therefore. They represent the points which have struck the Yeomanry Officers and the Adjutant of one of the Brigades in question during the conversion from cavalry to artillery; and are put forward as the views of "new-comers to the game" rather than of "experts." Some of the points refer purely to "Yeomanry Brigades" but many apply to all Territorial R.F.A.

2. Personnel.

The average Territorial Officer, N.C.O. or man has a full time job of his own; his soldiering is put in after work in the evening (some 50 hours or more per annum, not including travelling time). In addition he attends camp for a fortnight which is often his only holiday. Nothing but keenness will make a man volunteer for this; consequently, when he comes to drill he expects to work and resents being kept hanging about or wasting time by an inefficient instructor.

In Yeomanry days the officers were recruited in the hunting field, while the other ranks contained a high proportion of farmers. On this basis a high standard was built up with a strong "Yeomanry Spirit." It is difficult to obtain the same standard of recruits as Artillery, chiefly because one can no longer enlist small bodies of men all over the county; but the influence of the officers, combined with the name and tradition of the Yeomanry should be sufficient to give full numbers of a very high standard.

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Such measures as charging an entrance fee to recruits, having a waiting list from which serving men select recruits, having the messing of all ranks run by contract at camp, all help to raise the standard.

As may be imagined, the horse is a very powerful recruiting agent. Mechanicalisation would be a tremendous blow to Yeomanry Brigades. In the writer's area the Territorial Association own a number of horses which they use for teaching riding. The local Masters of Hounds have very kindly agreed that other ranks in uniform may hunt these horses without being capped. Experience shows that work on the above lines draws into all ranks a type of man who would not volunteer into any other unit. It not only forms a valuable unit in itself, but also gives a preliminary training to a large number who would be fit for commissions at an early stage of a big war.

3. Difficulties

(a) *Dispersion.*

A necessary difficulty in a "Yeomanry Brigade" will be dispersion. To get your high standard you must cover a lot of ground. A Brigade may have as many as 10 stations at distances up to 30 miles from H.Q.

The permanent staff consists of 1 Adjutant and 4 or 5 Instructors (Regular B.S.M's or Sergts.). These Instructors must therefore be on their own to a considerable degree; their duties entail recruiting both Territorial and Regular, mounted and dismounted drill and instruction, care of equipment, administration and pay, construction and use of artillery miniature ranges, etc. A bad man is not only useless but definitely harmful, as he lowers the standard from recruit to finished article.

(b) *Attachments, Courses, etc.*

The factors which affect the amount of work done during the year on these lines are as follows:—

The personal energy of officers and other ranks.
The personal energy of the Adjutant.
The willingness of Regular Batteries to help.
The encouragement given by higher Command.
The money available in the Divisional Training Grant.
The inability of the average officer or man to leave his business for more than a few days.

The whole is overlaid by an elaborate channel through which applications, sanctions and payments have to pass. This not only wastes time and paper but makes the Territorial unit feel that it is a long journey from itself to the Regular unit or establishment with which it wishes to work.

(c) *Equipment.*

Every officer knows the difficulty of the "Q" side in a Regular Battery. The Territorial Battery works on the same lines on a very similar "Q" list. Each Battery has a Territorial B.Q.M.S. who is paid £50 per annum.

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The principle underlying this is that Batteries should train their own B.Q.M.S's ready for war. In practice with equipment lying at 4 different stations a heavy and unfair responsibility lies on a Battery Commander's shoulders.

Deficiencies are bound to arise unless the B.C. defeats the scheme by some such means as enlisting an ex-Regular Q.M.S. on discharge.

(d) *Annual Training. Horses.*

Most of the outriders are brought by the officers and N.C.O's and are of a very good stamp. The draught horses are either "boarded outs" or hirelings from a contractor. The uninitiated should imagine 3 batteries detraining simultaneously at Amesbury, each being met by 50 unknown, unteamed and untrained draught horses who have never seen a gun before. Include a proportion of recruits who have never driven in a team and comment is unnecessary. Furthermore visualise the first 4 or 5 days at camp, during which time the whole energy and ingenuity of the battery is spent in coaxing these horses into shape. The writer's sentiments were twofold—unstinted admiration at the way in which the horses were tackled and pure blasphemy at the thought that every Territorial Brigade must be wasting in unproductive work almost 50% of their most important fortnight.

(e) *Annual Training. Instructors.*

The Permanent Staff is not sufficiently large to undertake the administrative and instructional duties which fall to it in camp. At Larkhill the School of Artillery gave great help by loaning Officers and N.C.O's, but when the Brigade camps in its own county it would be of great assistance if there were a pool of officers and N.C.O. Instructors on which one could indent.

The Adjutant should know where this re-inforcement is needed. This was practised most successfully when camping at a Regular station. A Regular Brigade lent a Subaltern to each Battery and supplied specialist N.C.O's as required to lecture, instruct, or assist throughout camp.

4. Suggestions.

Having touched lightly on some of the outstanding difficulties, the following suggestions are put forward as being inexpensive lines on which development is possible.

(a) *Closer Liaison with the Regulars.*

On the rare occasions when it has been possible to arrange joint work with a Regular Battery, it has been most successful and productive. But they *are* rare occasions, due to individual effort rather than ordinary routine. Once the Territorial and Regular Batteries have got to know one another it is an education to see the keenness of the Regular B.C's Assistant or N.C.O. i/c Signallers in instructing his opposite number. There is here a potential method of instruction lying dormant, which needs only a slight increase in the training

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grant, an increased liaison between Territorial and Regular Units, and recognition by higher authority as an accepted matter of ordinary routine.

There is no suggestion that such methods are discouraged at present by those in authority; but it is urged that the present channel between Regular and Territorial Units passing through Division to Command and back again is too long.

It is suggested that each Regular Brigade R.F.A. stationed at home should officially become "Godmother" to the adjacent Territorial Brigades. In such capacity it should advertise interesting portions of its programme, such as special miniature range work, tactical exercises, etc., to its godchildren, and that the Territorial C.R.A. should be able to sanction the godchildren's visits as long as his Training Grant lasted. In a number of cases where Territorial and Regular Stations coincide, pay would often not be claimed. Conversely the godchildren should be able to write to the godmother to say that Sergt. Flag and Sergt. Hammer wanted a little polishing in signalling and fitting, and could get away for four days the week after next. Might they come?

As things are at present, it is often the month after next before the attachment can be arranged. It is then a fortnight's course and both Flag and Hammer are working overtime at their own trade and cannot attend. Such a scheme as the above would give the Regular Brigade a definite interest in and knowledge of the Territorial Artillery with which it will have to work in any big war. It would broaden the outlook of all ranks (which is apt to become narrow in barracks), would try out the efficiency and enterprise of young Officers and N.C.O's in handling keen and quick learners. If Territorial Officers had a regular Mess where they could, from time to time, put forward some of their queries, their Adjutants at least would be pleased. Having seen modest attempts made on these lines since the war, the writer feels that great help could be given to Territorial Artillery on these lines, that the Regular is prepared to help and the Territorial to be helped; but that definite liaison between units is essential, which might even entail a certain measure of responsibility in the godmother for her godchildren's progress.

(b) *Permanent Staff.*

The Regiment should help by sending good Permanent Staff Instructors. At present one sometimes hears "Oh! Sergeant Blank is a dud. Let's send him to the Territorials."

Territorial Associations should help by guaranteeing good quarters. A slight monetary inducement is needed to make the job a "plum," and every care should be taken to see that service with the T.A. does not prejudice promotion. It is suggested that N.C.O's should be recommended by their Battery Commanders and should be sent to a short Territorial Course prior to posting, either at the Depot or at the School of Artillery. It need not be a long course as it is the groundwork of gun drill, riding, driving and care of equipment which

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they will have to teach. The course should include a few lectures on Territorial administration and pay.

A percentage of B.Q.M.S's would be valuable, one per Territorial Brigade being a suggested solution of the equipment difficulty, but he must also be fully qualified as a general instructor. Nor must signalling be forgotten, at least one Permanent Staff instructor per Brigade should have considerable knowledge of Battery signalling.

(c) *Practice Camp (the most important points of all).*

It is suggested that it might be possible to extend the godmother system to practice camp by keeping a Depot Brigade at the camp (on the lines of a Depot Battery). Where a godmother link already exists every effort might be made to continue the link at practice camp, making Regular and Territorial Brigades into host and guest.

The guest (T.A.) Brigade should bring only men, chargers and outriders to camp, leaving their guns at home stations—a considerable economy. This would obviate the need of holding on charge a mass of spare parts, which are the despair of the (T) B.Q.M.S.

For the first week the guest Officers should handle the Regular Batteries, gradually replacing Regular N.C.O's and men with Territorials; while the Officers and N.C.O's of the host Batteries concentrated on polishing the elementary work of the rank and file of the guest Batteries. The enormous dissipation of energy on untrained horses would not take place and by the second week the guest Batteries should be ready to drill, manœuvre and practise under the critical and interested eyes of their hosts.

A combined Officers' Mess, and mounted and athletic competitions in spare time would not be the least important parts of training.

From a general point of view such a scheme, even if it could only be given to a Territorial Brigade at rare intervals would have an enormous effect in making the Territorial Gunner feel that he was really part of "The Regiment." It would also distribute the training of and interest in Territorial Brigades throughout the Regiment, rather than concentrating it in a few isolated individuals who feel that their efforts are isolated rather than part of a general movement.

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SMOKE AS A WEAPON OF WAR.

By COLONEL C. J. D. FREETH, R.A., I.O.D.

AN article bearing the above title and written by Major R. T. Holland appeared in the July number of the Journal of the United Service Institute of India and was reprinted in the November number of this Journal.

In it Major Holland states that, "By the 15th century the smoke of black powder had begun to take charge of the atmosphere of battle-fields, and the deliberate use of controlled smoke was at a discount." A little further on he remarks, "As long as black powder held the field the use of controlled smoke was forgotten."

It is strange that this should be so seeing that Smoke Balls did not become obsolete till 1883,* and they are mentioned in "The Great Art of Artillery,"† a book written by a Pole named Casimir Simienowicz, in the middle of the 17th century.

The author of this work, in giving a description of smoke balls, says "We have a way of preparing balls, which during their combustion cast forth a noisome smoke, and that in such abundance that it is impossible to bear it."‡

Three principal uses were assigned officially to these smoke balls :—

(1) To suffocate or expel the enemy or his working parties from mines, casemates, between decks, or other confined situations.

(2) To conceal one's own operations or position, or to mislead the enemy with respect to them.

(3) To serve as signals in the Arctic Regions.‖

Nothwithstanding this and although smoke balls undoubtedly existed for the purpose of producing controlled smoke, I have been unable to find a specific mention of smoke balls being actually employed in any campaign since the introduction of gunpowder. The

* W.O.L.C. Section 4345.

† Printed in English in 1729.

‡ Page 287.

‖Treatise on Ammunition 1867. p. 89.

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official report of the Siege of Sebastopol* gives a return of ordnance, ammunition, etc., sent from Balaklava by railway conveyance between 28th February and 9th September, 1855. In this return various stores such as rockets and light balls are included, but there is no mention of smoke balls.

Again, the smoke balls were made of such sizes as would enable them to be fired from the different natures of mortars, but as the shell only consisted of papier-maché, it is very doubtful if they could have been fired without breaking up. No official charge was ever laid down for them. If, therefore, they were used at all, it is practically certain they were not used as gun projectiles but were thrown or deposited by hand.

The above is written, not with any intention of criticising Major Holland's very interesting and instructive article, but because it may be of some academic interest to students, like myself, of the history of ammunition.

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* An account of the artillery operations at the Siege of Sebastopol, compiled by Captain W. E. M. Reilly, C.B., 1959.

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THE MINOR TACTICS OF "CLOSE SUPPORT" BY ARTILLERY IN THE ATTACK.

1. A word of apology and explanation is due for the cumbersome title of this article.

The word "close" used as an adjective, though an accepted term, is misleading, because it is associated with the idea of physical proximity. This idea however is in point of fact only a secondary sense of the adjective "close" and to judge by Webster's dictionary the sense is metaphorical rather that literal. It means "intimate" rather than "locally near." In consequence of this misuse of the word there is a tendency to think that in order to give really "close" support guns must move alongside or almost alongside the troops they are supporting. Such notions lead to suggestions for "infantry guns,"a form of organization that Frederick the Great discarded as an anachronism. The French term "canons d'accompagnement" conveys an equally misleading idea. Artillery on the move has no power of offence or defence if we rule out the tactics of Norman Ramsay; and artillery fire has obvious disadvantages to the troops it covers when the guns in action are very near them.

I admit however that it is difficult to find a better term and will not attempt to do so.

2. The expression "minor tactics" as applied to the subject under consideration, includes all the indispensable details which have to be taken into account before and during a small offensive operation undertaken by infantry (or dismounted cavalry) supported by artillery and with or without tanks. Such an operation might occur in an advanced guard action or during the exploitation of a successful attack on the main zone of a hostile position in open warfare. The force employed would not as a rule exceed a battalion supported by six or eight guns (18-pr., 4·5 howr. or 3·7 howr.) and a section of tanks. The fighting would probably resolve itself into battalion or company attacks on defended localities, each infantry unit being supported by a proportion of artillery. The defence is not likely to be highly organized. Artillery fire must be observed. Map shooting is not possible.

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3. The object of this paper is to discuss the minor tactical problems that confront artillery officers when acting in support of infantry or dismounted cavalry. Tanks are not specifically dealt with, as the support of tanks by artillery in minor operations differs only in detail from the support of other arms.

4. It will be useful at first to state briefly the object of artillery support, and the conditions which must exist if support is really to be "close" in the accepted sense of the term. Artillery supplements and intensifies the covering fire without which the forward movement of the infantry is not possible. Its task was admirably put by Marshal Lefèvre when he sent for his chief of artillery before an attack and said : "Je n'entends rien de votre affaire, mais fichez-moi un trou et j'y passerai." "Fichez" is unparliamentary, but the Marshal's meaning is obvious.

The efficacy of artillery support is directly proportionate to the rapidity with which fire can be brought to bear on the point of resistance, and to the accuracy with which it can be maintained up to the last possible minute before the assault is delivered. In other words support will not be effective unless the officer directing the fire of the artillery is in constant touch with the situation of the attacking troops, and can convey orders to his guns, without delay, in accordance with the progress of the attack. Thus the artilleryman has, as it were, two "lines of communication" to maintain : one with his own guns and the other with the troops whose movement he is covering.

It may be argued that these statements imply the notion of "physical proximity." It is true that they do, and that to a certain extent physical proximity is necessary especially between the commanders. But they express much more clearly the need for good observation, and for good communications.

5. In all operations of war small or great the first process is reconnaissance, for reconnaissance in its various forms is the means of obtaining information without which no operation can be planned. In his "Thoughts on Co-operation" published in the R.A. Journal of September, 1923, Major Duncan points out the necessity for combined reconnaissance by officers of the different arms. Without such reconnaissance confusion and delay are almost inevitable.

6. Reconnaissance is followed by the drawing up of the plan of action, which expresses the intention of the commander, just as, in the sequence of operation orders, "Intention" and "Method of Execution" follow "Information" in regard to the enemy and our own troops.

In making up his mind what to do and how to do it, the commander must be influenced by the "Principles of War" as defined in F.S.R. Vol. II (pp. 15 and 16). The process of making a plan is clearly defined in "Elementary Tactical Training," published by the War Office in January 1923.

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In a minor operation the plan must be drawn up by the commanders of the various arms in consultation, and as a result of their combined reconnaissance. This is necessary in order to ensure cohesion, and to save time which is of vital importance.

It is also necessary that officers should be so familiar with the points that require consideration when planning a combined tactical operation that the latter become, as it were, a matter of drill or routine. It is only by knowledge of the tactics of other arms as well as their own, and by constant practice both with and without troops that this familiarity with small but essential details can be acquired.

7. It will be convenient now to consider, as a typical example, the concrete case of an advanced guard consisting of a troop of cavalry and a battalion of infantry, supported by a battery of 18-prs. and a section of 4·5 howrs. Let it be assumed that the vanguard is held up by two small defended localities, and that the advanced guard commander decides to attack as soon as possible with troops from the main guard.

The advanced guard commander (in this case presumably the O.C. Battalion) having made his reconnaissance in company with the senior artillery officer allots a company supported by a section of guns (or howitzers) and perhaps by some of the battalion machine-guns, to the attack of each locality.

8. The plan as we have said should be made by the A.G. commander and the artillery commander in consultation, and the question at once arises as to how far the latter should urge his own views as to the best line of attack, supposing that there are alternatives which is often the case. The infantry have to seize and hold the position, and the limitations imposed upon them by the nature of the country and by other factors in the situation must receive full consideration. But it is as much the duty of the artillery commander to point out the best means of ensuring effective artillery support as it is the duty of a tank commander to point out that the ground here or there is unsuitable for the action of tanks. He must be prepared to say "If you attack in this way I can give more help than if you attack in that way." For example he could remind the advanced guard commander that it is easier to fire over the heads of infantry marching up hill than on the level, particularly with 18-prs., and that if the ground is very level it is better for the line of advance to be at an angle to the fire of the guns. An attack by one line might give better observation to the guns and make communication between guns and infantry easier, than an attack by another, and so on.

9. We have now to consider the action of the artillery commander, who would presumably be the commander of the 18-pr. battery, during the preliminary reconnaissances. His immediate purpose is co-operation, the eighth and last of the Principles of War as set forth in Field Service Regulations. Four other principles must

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be kept in mind, namely, Surprise, Concentration, Economy of Force and Security.

In regard to co-operation it is worth while repeating that "the efficacy of artillery support is directly proportionate to the rapidity with which fire can be brought to bear on the point of resistance, and to the accuracy with which it can be maintained up to the last possible minute before the assault is delivered."

To fulfill these conditions the supporting artillery must be brought into action quickly, and there must be some means by which the officer directing its fire can keep continuous touch both with the situation of the troops he is supporting and with the guns under his command, the two "lines of communication" referred to in para. 4. In ideal conditions he can keep touch with the progress of the attack by using his eyes, and with his guns by means of his voice. But so favourable a combination of circumstances will seldom occur.

The Principle of Surprise is applied by the selection and rapid occupation of a covered position by a line of advance concealed from the enemy's ground observation and as far as possible from that of his aeroplanes, aind by reserving fire to the last minute.

Fire must be accurate and well sustained, and of sufficient volume to keep the enemy's heads down. In other words it must be concentrated.

No more guns and no more ammunition should be used than is necessary. The rapid rate of fire which can be developed by modern artillery makes economy of guns easy, but tends to extravagance in the expenditure of ammunition.

Security would almost invariably be ensured by the position of other troops though it might occasionally be necessary to ask for an escort. On the other hand local protection against air attacks must never be forgotten. It is always needed.

The artillery commander must train himself so that he applies the principles of war sub-consciously while formulating an artillery plan. With regard to the making of a plan to suit a given situation, Appendix B of Elementary Tactical Training shows us that one must successively consider the object in view, the probable action of the enemy, the effect on the situation of neighbouring bodies of our own troops and finally the ground. The object in the case we are considering is of course to clear the enemy out of the way. The action of the enemy would probably take the form of defensive fire, and possibly local counter-attack. In this connection I think that the gunner should always consider the possibility of shelling the enemy out of his positions without waiting for the development of an infantry attack. If he can do this, and it might often be possible in an advanced guard action, time will be saved and casualties reduced if not avoided altogether. If he is not successful he will at any rate have found the range to the objectives which the infantry are to attack. On the other hand there

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is always a risk of giving the enemy warning of what is to come, and the commander of the force must decide whether it is worth while attempting to shell the enemy out or not.

If and when the infantry attack is launched the objects of the artillery are :—

(a) To hamper and if possible silence the enemy's small arm fire, both from the front and from the flanks, from the moment the infantry are exposed to it until they are within assaulting distance of their objective. Fire must not lift off the objective until the attacking troops are so close to it that they can go no further without serious danger from their own guns. To judge this moment is one of the main difficulties in a minor operation especially if there is no time table. In fact there ought always to be a time table to fall back on in case communication breaks down between guns and infantry, or between the artillery commander and his guns.

(b) To repel counter-attacks.

(c) To neutralize hostile artillery fire when possible and necessary.

11. The next point for consideration is the effect on the situation of neighbouring bodies of our own troops. Except from the point of view of security the effect will not be very great in the circumstances with which we are dealing. It is improbable that any help from neighbouring artillery would be available, as it would usually be occupied on its own front. But the point should not be lost sight of.

12. Lastly the ground must be studied, and is of course the deciding factor. On its nature depend the gun positions and the approaches to them, the observation, and the possibilities of intercommunication which makes surprise possible and co-operation effective.

13. Assuming that the plan has been decided on, we have now to consider in detail the duties of the artillery commander. It should be remembered that in the force we have taken as an example the guns available are drawn from two different batteries.

The artillery plan should be put into effect in a logical sequence of operations somewhat as follows :—

(a) The guns should be ordered forward to a rendezvous, if possible off the road and concealed from air observation. Time would usually be saved by sending this order at an early stage, preferably as soon as the decision to attack is made and before the detailed plan is determined.

(b) Subordinate artillery commanders to whom orders are to be given must be sent for. If the attacks on various localities are to be supported by sections as would often happen (and certainly in the case under consideration), orders should be given direct to the section commanders concerned.

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As soon as they arrived the artillery commander would take them to some point from which he could point out the objectives and describe the general plan of operations.

(c) Having made this reconnaissance he would then issue his orders. These must be given verbally and taken down by the recipients in the form of short notes. They should always be given in the same sequence as below :—

(i) Allotment of objectives.

(ii) Areas for positions and O.P's, and routes for advance into action.

(iii) Orders as to the organization of command, e.g., the grouping of sections with companies of infantry, or of batteries with battalions.

(iv) The organization of artillery support which must include general instructions as to :—

When fire is to be opened.
How long it is to be maintained on the objective.
How fire is to be directed after the capture of the objective.
What the rate of fire is to be.
The nature and quantity of ammunition to be used, including smoke.
Any instructions as regards co-operation with the air.

(v) Intercommunication with the artillery commander and with other arms, including the position of headquarters.

(vi) The hour of attack.

12. We have lastly to discuss the duties of a section commander who has been ordered to support with his guns the attack of a company as indicated in para. 11 (c) (iii) above. As so often happens to a junior officer, his task is perhaps the hardest, and it is of unbounded importance. The writer is of opinion that the section commander must make time to see and talk to the company commander in question. It is only by mutual preliminary arrangements that cohesion can be ensured; and there can be no true co-operation without personal touch between the commanders concerned. The moment when this interview should take place cannot be laid down, and will vary with the circumstances of each case. The guns must be got into action, and that as a rule should be the gunner's first care. Both the individuals concerned however are mounted, and should make full use of their horses. Moreover they are almost certain to meet when sent for by their respective chiefs to receive orders, if only for a moment, and can then arrange to meet again later.

13. Arrangements for co-operation must form the principal subject of their consultation, and as stated in para. 4 effective co-operation involves the maintenance of two lines of communication;

(a) Between the artillery commander and his guns.

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(b) Between the artillery commander and the infantry.

For the former the artilleryman is alone responsible; for the latter the responsibility is shared.

14. The character of these communications will, as we know vary with the nature of the country, and ideal conditions will rarely be attained. It will not often happen that the officer who is directing the fire of the guns will be able to command his guns by voice and from the same place have a good view of the movements of the infantry. On the other hand improvements in wireless telephony will no doubt eventually make communication easier. With means of communications as they at present exist it is probable that on most occasions telephones and visual signalling will have to be used to supplement eye and voice. "Voice control" especially when howitzers are used may occasionally be possible, but a short telephone line from the O.P. to the guns will be the rule.

With regard to communication with the infantry, except in very favourable country the whole of the ground covered during the advance will never be visible. It is indeed only too likely that it will be difficult to find an O.P. which commands the point of attack except at some distance from the guns, and every yard a telephone is extended reduces the security of communication. It will often happen too that in order to keep in touch with the infantry an artillery patrol, including signallers, will have to go forward with them. There may be occasions on which a telephone line could be laid forward, but time will not often be available, and the line is unlikely to be reliable.

15. The interview must necessarily be short, therefore both the infantryman and the gunner must be quite clear as to the information each requires of the other. There ought to be "cut and dried" agenda for it with which each is so familiar that the procedure becomes second nature like drill. This will perhaps be made clearer by giving the questions each should ask. They are equally applicable to the previous conference between the artillery commander and the commander of the force (see para. 8).

It must be remembered however that neither officer can go beyond the orders given him especially as regards time (see para. 11), though in such orders some latitude might reasonably be allowed.

16. The infantryman's questions would be approximately as follows:—

(a) What are you going to fire at?
(b) How soon will you be ready to open fire and how can you let me know that you are ready?
(c) How long do you propose to go on firing?
(d) Will you see my men during the advance and as we approach the objective? If not, what arrangements can you make for keeping touch with our movements?

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(e) Can you control your fire by voice? If not, can you arrange for fire to lift by time table in case communication between you and your guns breaks down?

17. The gunner would ask :—

(a) What do you want me to fire at?
(b) When will you be formed up for attack and where?
(c) How can you let me know when you are ready to attack?
(d) What is your line of advance and where do you expect to be when you first come under the enemy's rifle and machine-gun fire from the objective or from the flanks? This is important because I ought to open fire just before you reach the point in question. Can you make any signal to let me know when you want fire opened?
(e) How long will it take you to reach your objective from the forming up place, or from the point referred to in (d)? I must know this in order to make a time table in case I lose communication with my guns at the critical moment or get "knocked out." Can you make any sort of signal for fire to lift. This might be necessary if you saw that the enemy had evacuated his position and we did not.
(f) Will smoke help you? Anyhow I suggest firing a few rounds of smoke at the beginning of the bombardment to blind the enemy, and again at the end so as to indicate to you that fire is going to lift.
(g) Do you want me to fire at anything in particular after you have captured the objective?
(h) How can you call for assistance in case of counter-attack?

It will be noticed that the above questions overlap considerably, as is indeed natural.

18. To sum up, it would appear that the following points must be agreed on and understood by both parties.

(a) The objective of artillery and infantry.
(b) The line of advance of the infantry from their forming up place.
(c) The moment of opening fire, and the time it will take to reach the objective which governs the time of the "lift," and to a certain extent the rate of fire.
(d) Signalling arrangements from front to rear throughout the operation (or other means of communication).
(e) The use of smoke.
(f) Artillery support after the capture of the objective.

Without definite arrangements of this nature the success of the smallest operation will be imperilled.

19. One important point has not yet been discussed, namely the character of an artillery bombardment in local operations with small forces. In the concrete example we have been considering, the enemy's position has of course been definitely located, and there

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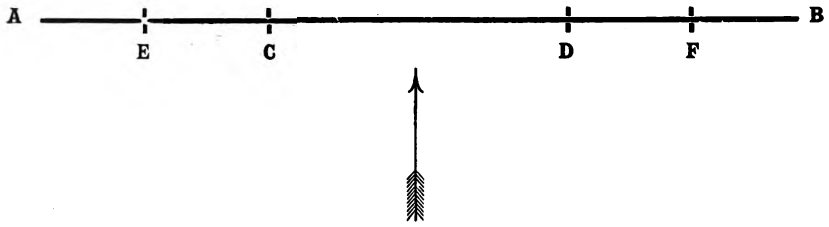
is therefore no doubt about the objective for the fire of the artillery. In such a case there can be no question whatever that as much artillery fire as is necessary must be concentrated on the enemy's position and that the bombardment must be continued at a fairly intense rate—at the beginning and at the end it should be very intense—from the moment the infantry come under the enemy's small arm fire, or more correctly *just before* that moment, until they are on the point of reaching the objective. When the extent of the objective is definitely known it is fairly easy to estimate the number of guns which will be required.

It must often happen however, especially in enclosed country, that although the locality from which the enemy's fire comes is known approximately it will not be known exactly. The margin of doubt as to the location of his position may be from front to rear or from flank to flank or both.

To put it more clearly, we may know that the enemy's position must be on the line AB as shown in Figure (1), but we may not know whether his flanks rest on C and D or on E and F.

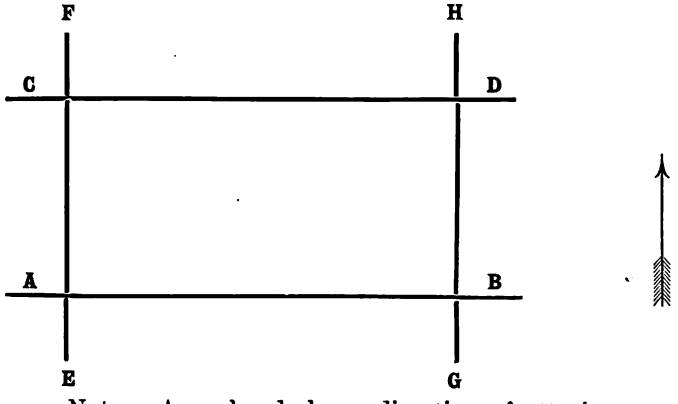
FIGURE (1).



Note.—Arrowhead shows direction of attack.

Or again we may know that his flanks rest on the lines EF and GH, though we do not know whether the general front of his position is on AB, or on CD or on some intermediate line, as in figure (2).

FIGURE (2).



Note.—Arrowhead shows direction of attack.

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Lastly, but only between reasonable limits of space, we may be ignorant both of the exact front and of the exact flanks.

It is clear that when there is a doubt as to the exact position held by the enemy the artillery must be prepared to use more guns and more ammunition, to employ searching and sweeping fire, and if necessary to fire a short creeping barrage which must open *on our own side* of the nearest point the enemy can possibly occupy. Indeed it is probable that the last-named method (the barrage) is the most satisfactory because it will have the effect of keeping the enemy's heads down as the infantry arrive at the various occupied points in succession, whereas the more or less rambling and scattered bombardment of an area may not. Economy of ammunition is important, but it is uneconomical to fail to capture a position by stinting it.

20. The writer hopes that these notes may be of some value both to infantry and artillery officers in the making up and solution of small tactical schemes with and without troops. The support of an attack on a large scale is far better understood, and indeed is less difficult to arrange than the support of a small and local operation when time is a matter of urgency. Moving warfare however, both in attack and defence, will consist to a great extent of a number of more or less simultaneous local operations by mixed forces. Hence success will depend on the tactical skill of the local commander and on intimate co-operation between all the arms under his orders.

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MODERN DEVELOPMENTS IN FOREIGN ARTILLERIES OF THE FIELD ARMY.

BY MAJOR V. DRAKE-BROCKMAN, R.A.

IT is proposed in this article to deal with certain categories of artillery and related matters as follows:—

Wheeled Horse, Field and Accompanying Artillery.
,, Medium and Heavy Artillery.
,, Mountain Artillery.
Mechanicalised Artillery.

Since the war the general policy of all countries has necessarily been circumscribed by financial considerations. The lessons learned in the war have, however, served their purpose well, and practically all of the major powers are bending their energies to the experimental development of types of artillery of all calibres, which patterns when sealed can be put into manufacture at a moment's notice.

So far as is known, no actual re-armament is in progress anywhere. Very large numbers of equipments manufactured during the war are in existence and all such as are sufficiently up-to-date are being retained to serve as a stand-by, until the more advanced experimental types can emerge. It might perhaps be as well to give a very brief résumé of the development of foreign artilleries up to the close of hostilities in 1918, before mention is made of more recent development so that a truer appreciation of the very great changes now taking place may be obtained.

Field Artillery.

The period up to 1897 was that of the recoiling or semi-fixed carriage. Of this type were the Russian 90$^{m/m}$ 1895 equipment, the German 77$^{m/m}$ 1896, the Austrian 90$^{m/m}$ of 1897, the Italian 75$^{m/m}$ of 1901 equipment, and that of Japan of 1898. In all of these a variety of methods were employed to partially limit the movement of the carriage in action.

In 1897, the French 75$^{m/m}$ equipment appeared and at once the Artilleries of all the other Powers became moribund. Each nation set to work to re-design and a variety of Q.F. equipments were produced. For example the German 77$^{m/m}$ 96 n/A with which they took the field in 1914, was a conversion of the original 1896 equipment, whose only merit lay in its lightness. So little at that time was the true value of the long recoil and air recuperator system appreciated, that Italy in 1901 retained a semi-fixed carriage, whilst Russia evolved an equipment in 1900 having an indiarubber recuperator giving a comparatively short recoil; this was subsequently

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discarded in 1906 for a long recoil carriage with a spring recuperator. In the meantime, the firm of Schneider had developed their system of air recuperation. Very extensive trials were then carried out during 1901 and 1902 in America, 1903 in Switzerland, and 1907 in Greece, with a view to determining the relative merits of the spring recuperator (Krupp system), and the French system, with the result that Krupp equipments were supplied to Switzerland, Sweden, Denmark, Italy and Belgium, whilst the French firm obtained orders from Portugal, Spain, Bulgaria, Servia and Greece.

In all cases the arc of fire and elevation of these equipments were limited respectively to about eight degrees and sixteen degrees giving a maximum range on the carriage of approximately 6,500 yards. During the course of hostilities the necessity for increased range and arc of fire became more and more pronounced. The pressure of demand for anything and everything which would serve to meet immediate necessity was so great however, that little could be done towards a new design. British firms alone produced an entirely new field equipment whilst the war was still in progress.

Since then enormous strides have been made in range, arc of fire, ballistics and mobility. Unfortunately very little information is available for countries other than America, France and Italy.

America.

Prior to the war the American field artillery was armed with a 3-inch equipment, model 1902. This was of conventional type having a single trail, spring recuperator, pivot traverse, non-independent line of sight. Later, the French 75$^{m/m}$ was adopted and used during the war.

In 1918, a board of officers under General Westervelt, after a prolonged visit to France, laid down ideal requirements for artillery of all natures, and for the field artillery these were as follows :—

	Gun.	How.
Maximum and normal range	15000/11000	12000/10000
Elevation	80°	65°
Traverse	360°	360°

The first of the new equipments was designed in 1920 to take either the 75$^{m/m}$ gun or the 105$^{m/m}$ howitzer. This had a split trail, St. Chamond type H.P. recuperator, controlled length of recoil, rear trunnions with spring balancers. Owing however to the excessive elevation given, 80 degrees for both gun and howitzer, and the fact that the carriage had to be made strong enough to take the howitzer as well as the gun, the weight proved to be excessive. Interchangeability of a field gun and a field howitzer is a difficult problem to settle satisfactorily.

A box trail design was then produced for the gun and howitzer separately. That for the gun was 800 lb. lighter than the first design. It has a similar recuperator but with constant length of recoil, rear trunnions, independent line of sight and cross-axle traverse. The axletree is curved about the point of the spade to facilitate traverse, a design tried many years ago on a French 220$^{m/m}$ howitzer and more recently in an 18-pr. of Beardmore design (1923).

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The muzzle preponderance is balanced by a single spring, placed underneath the cradle. The gun is laid for elevation by arc and spur gearing in a manner very similar to the British equipment.

The shielding of this American 1921 equipment is unusual in that the shield is carried well in rear of the axletree, almost at the point of the trunnions, with the result that the major portion of the gun, recoil system and elevating arcs lie exposed to the front.

The howitzer carriage in design is identical with the gun carriage and will be under 36 cwt. behind the team.

Concurrently with these two designs, a further split trail design for the 75 m/m gun has been produced which should be about 3 cwt. lighter than the original. In general design this model is very similar to our 3·7-inch howitzer but with independent line of sight and rear trunnions. Roller bearings also are freely employed on the trunnions, elevating shafts and round the stem of the pivot where it enters the axletree. The disposition of recoil and recuperator cylinders is unusual. The system generally is a modification of the French 75 m/m gun (Puteaux) type. The gun is carried in the centre portion of a block, in the lower part of which is the liquid cylinder having the ram attached to the front part of the cradle. The liquid passes round the gun by passages to the upper cylinder in which is the floating piston. This arrangement brings the bore axis of the gun and the C.G. of the recoiling mass in close proximity, which is advantageous. The road clearance in the original design was 14 inches with a 48 inch wheel, this has been subsequently increased to 20 inches with a 56-inch wheel.

There is still a considerable difference of opinion in America as to whether the advantages obtained from a split trail compensate for the additional weight involved.

France.

The famous 1897 model equipment is too familiar to require special mention beyond the fact that in common with all single trail equipments, it suffers from lack of range and arc of fire.

The original 75 m/m was tentatively re-designed by Col. Deport in 1908, but was not introduced. In this design the Abatage brakes were omitted and a spring spade arrangement similar to the British 15-pr. B.L. substituted. The buffer was purely pneumatic, and an independent line of sight on the Krupp arrangement introduced. The total weight behind the team was thus brought down from 39 cwt. to 33 cwt., with a view to arming the R.H.A. with this equipment. An experimental 75 m/m model was also tried in the 1901 French manœuvres. This equipment had spring recuperation.

It appears to have been recognised that the Puteaux recuperator (75 m/m type) whilst excellently designed and still more excellently manufactured suffers from an excess of complication and is both expensive and difficult to make. The majority of other French equipments follow the standard design of the firm of Schneider.

At present, therefore, this French firm is developing field equipments with a view to increase of range without loss of mobility and are concentrating on the following types :—

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(1) 75$^{m/m}$ gun. Range 13,500 yards. Max. Elev. 40°
(2) 105$^{m/m}$ how. Range 11,000 yards. Max. Elev. 40°

The design includes a recoil mechanism similar to that of the 155$^{m/m}$ howitzer, with rear trunnions and counterweight, non-independent line of sight, axle traverse. Generally, therefore, the design will follow the well-known Schneider type. The split trail although originated by the designer of the French 75 does not appear to have found favour.

Italy.

The war left Italy with a very large number of guns both of their own and of foreign makes captured during the war. In 1919, there was a general combing out of all undesirable types. The artillery accompanying the division will consist of 75$^{m/m}$ gun arranged for pack transport and 100$^{m/m}$ howitzers motorized. The split trail Deport 75$^{m/m}$ equipment brought out in 1912 has not been generally adopted but will form a motorized reserve for the division.

Accompanying Artillery.

This form of artillery is a modern development, an outcome chiefly of the advent of the tank and machine gun emplacement. The ordinary field equipment is too heavy for the purpose. The only equipment successfully used during the war for this purpose was the German 96 n/A.

Italy.

A separate type of equipment is not looked on with such favour as in other countries, and although an equipment (details of which are given below) has been designed it is uncertain if any such will be adopted. At present the 75$^{m/m}$ referred to above constitutes the infantry accompanying weapon.

A 70$^{m/m}$ gun with a 6$\frac{3}{4}$ lb. shell having an H.E. charge of 2$\frac{1}{4}$ lb. M.V. 640 f.s., maximum range 1900 yards. The large amount of H.E. which is carried is due to the thin walled shell, which is possible on account of the low M.V. This shell will demolish barbed wire within 1 yard of the burst. The equipment breaks up into five loads, weighing from 51 to 101 lbs. Its total weight is 370 lbs. and it can be dragged over rough ground by one man.

America.

The Westervelt Board specified an equipment in which no component was to weigh more than 75 lbs. The total weight not being over 300 lbs.

The Americans in 1916 had adopted the French 37$^{m/m}$ equipment and the 3-inch Stokes mortar. With a view, therefore, to a design suitable for an anti-tank gun and to replace the Stokes, a 1·8-inch gun and 2·24-inch howitzer on the same carriage were tried. These equipments were tried and abandoned and at present (1923), a 37$^{m/m}$ gun and 2·24-inch howitzer and the 75$^{m/m}$ howitzer are under trial.

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The 37$^{m/m}$ gun is a most notable advance in design when M.E. per lb. weight of equipment is considered. The rotation of the axletree to give traverse is a novel feature. The equipment has disc wheels to facilitate handling in muddy or marshy positions. The gun is drawn back for travelling and the tubular trail legs are telescopic. In draught the carriage is attached to a limber with shafts for one animal for ammunition.

The total weight in action is 350lbs. and that of the limber with ammunition 300lbs.

Medium and Heavy Artillery.

This class of artillery can hardly be said to have existed in any well defined degree prior to the war. It was during the period 1914-1918 that very great advance was made in the mobilization of the heavy guns and howitzers.

The Germans were in possession of 105$^{m/m}$ and 150$^{m/m}$ guns and 150$^{m/m}$ howitzers which were well improved during hostilities.

France possessed hardly any medium field artillery. The 105$^{m/m}$ gun, 1913 Schneider, had only just appeared when war broke out. During the war an immense number of B.L. guns were hastily mounted on mobile carriages pending the manufacture of the more modern type Schneider equipments.

Towards the latter end of the war, French medium and heavy artillery consisted for the greater part of a variety of guns and howitzers from 105$^{m/m}$ to 280$^{m/m}$ Schneider, a certain number of the 145/155$^{m/m}$ St. Chamond equipments and 155 and 194$^{m/m}$ G.P.F.

No further developments of these classes are in progress.

The Americans were in possession of their 1906 4·7-inch gun at that time.

In view of present day development it is undoubted that the most notable advance in design was that of the G.P.F. type. This was due to Colonel Filloux and the design now forms the basis of modern development.

The equipment had many notable features which are being perpetuated and also suffered from certain defects. The latter comprised the necessity for a deep pit for the gun to recoil into at high angles, owing to the inadequate control of the length of recoil, and the disproportionate weight of the carriage compared to the ballistic effect of the gun due to keeping the recuperator block stationary during recoil and to the fact that in the case of the 155$^{m/m}$ and 194$^{m/m}$ respectively, the carriage is designed to take the gun bored out to 164$^{m/m}$ and 220$^{m/m}$.

Its notable features comprise :—A split trail, spring suspension of the weight on front and rear axles for travelling, a pressure fed buffer tank, rubber tyred motor transport wheels of small diameter, excellent packing arrangements in buffer and recuperator and a very neat and compact form of reciprocating sight.

America.

The Westervelt board laid down the following particulars,—

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	Medium Artillery.		Heavy Artillery.	
	Gun.	How.	Gun.	How.
Calibre	4·7″	155$^{m/m}$	155$^{m/m}$	8-inch.
Projectile	60 lb.	100 lb.	100 lb.	240 lb.
Range	12000/18000	16000 (max.)	18000/25000	18000 (max.)
Weight	107 cwt.		268 cwt.	

It was also intimated that designs should be of the split trail type to mount gun or howitzer interchangeably and have rubber tyred wheels for motor transport.

The 1920 designs for medium equipments fulfilled all the above conditions except as regards weight and for transport a separate wagon for the piece was provided. The lines followed very closely the G.P.F. with improvements in the axle suspension and reduction of time required to get into action. It also included pneumatic balancers, quick loading gear and roller bearing trunnions. Subsequently with a view to reduction in weight it was decided to forego the interchangeability of gun and howitzer, limit the elevation to 45°, and do away with variable recoil gear and quick loading mechanism in order to bring the weight limbered up below 107 cwt.

One carriage of this type has been made and is under trial. The shell weighs 50 lb., M.V. 2450, range 20,500 yards.

The heavy artillery 155$^{m/m}$ gun and 8-inch howitzer designs followed on parallel lines. It was found possible also to satisfactorily design one carriage to take both gun and howitzer. In this case however, variable recoil and a quick loading gear has been retained. The quick loading gear locks the firing mechanism when the piece is brought down and in this respect follows current French practice.

A separate wagon is of course provided in each case for transport of the piece. The recoil mechanism both in this and the case of the medium artillery is of the same type as the G.P.F. control of length of recoil, therefore, follows on the same lines, viz., constant for low angles, controlled for medium angles and subsequently constant at the shortest length.

The most notable advances in the design from the point of view of service of the gun in both cases are :—

(1) Reduction of time to come into action.

(2) Reduction of size of pit required.

The first has been achieved largely by improvement in the method of unshackling the front axle spring suspension. In place of separate jacks as in the French equipment, screw jacks are permanently built into the axle. The method of attachment of the trail ends to the spade has also been improved. The latter by the adoption of rear trunnions and controlled recoil combined. A certain amount of digging is required, viz., a 15-inch pit at 65° compared with a 24-inch pit at 35 degrees for the 155$^{m/m}$ G.P.F., which would have become 60 inches at 65° elevation.

Italy.

Italy appears to have discarded the idea of long range heavy artillery and is relying on the power of bombing aircraft to take its place.

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Mountain Artillery.

The only developments proceeding in this class are those being carried out by America and France.

The French are proceeding with two designs with a view to economy in calibres, viz :—

75 m/m gun ... Range 9000 yards.
105 m/m how. ... ,, 6000 ,,

Each of these will be mounted on carriages having a box trail, cross-axle traverse and Schneider recoil mechanism. The gun carriage will have a cranked axle.

The *Americans*, in 1920, designed and manufactured a 75m/m howitzer. The carriage has rear trunnions, the muzzle preponderance being taken up by a torque spring on the elevating shaft, a novel arrangement. St. Chamond recoil mechanism with variable recoil, axle traverse.

There are only four loads, no provision has been made for a shield. The loads are howitzer, cradle and recoil mechanism, wheels and axle, trail. The total weights respectively, including saddlery, are 310lbs., 342lbs., 294lbs., 326lbs. Weight of shell 15lbs., range 6,500 yards, M.V. 900 f.s. This equipment was not considered satisfactory in trial and another was designed in 1922, having 9,000 yards range.

In the 1920 equipment, the howitzer was in one piece and the piston rods recoiled with it. Of the total weight 54% recoiled. In the 1922 model the howitzer is in two parts and the piston rods remain stationary in recoil as in our equipments. The weight of the recoiling parts is increased to 80% with a corresponding reduction in piston rod pull of 35%. This makes a very great difference to the weight of the equipment.

Mechanical Transport.

The development of mechanical traction for all natures of artillery is proceeding rapidly. Prior to 1914 and during the war, commercial tractors and a certain number of caterpillar tractors were used, but the question did not receive deliberate attention until after 1918.

The *French*, in 1917, had, however, introduced platform caterpillar carriers for the 155m/m class, and 75m/m guns were mounted on lorries for long distances. In addition to these, caterpillar carriers for heavy natures, viz., the 120m/m and 194m/m guns and 220m/m and 280m/m Schneider howitzers were constructed by St. Chamond during the latter part of the war. These equipments consisted of two separate vehicles with electric transmission, one carrying the gun and the other ammunition with motor and dynamo. In all, 75 equipments of this nature were completed.

The *Italians* also, towards the end of the war, had introduced a wheeled carrier for their 75m/m guns.

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Since then the Italians have developed experimental types for field artillery, concentrating on a tractor to move with infantry and a high powered pneumatic tyred carrier for reserve artillery for long bounds. This latter can do 20 miles per hour with a radius of action of 300 miles. Later developments are on the lines of a pneumatic tyred tractor to move at about 12 m.p.h., with the gun mounted on a single axle with pneumatic tyred wheels and coupled up to the tractor by its own trail eye. This arrangement has been tried with calibres up to 150$^{m/m}$ and has been moderately satisfactory. It appears, however, that in Italy no development is being made with caterpillar tractors, and wheeled carriages have not yet been equipped with rubber tyred wheels.

In *America* very great developments are in hand. Two general types are under trial. The first is the conventional caterpillar track as manufactured by the Holt Manufacturing Company, and the other the "Christie" type. This latter is designed with four axles and a dismountable track. The wheels are rubber tyred, and the arrangements is such that the car can operate on front and rear axles at high speeds without the track on roads, or with the track on the four axles across country.

Of the conventional caterpillar type there were originally three designs, viz., 2½-ton, 5-ton, and 10-ton. The first was for haulage of the field gun, the second and third for the medium and heavy artillery.

It was found that these tractors were hardly powerful enough for the work they were called upon to do. The present designs for hauling field, medium and heavy artillery are :—

Field Artillery — Weight 3 tons. Speed 12 to 16 m.p.h.
Medium Artillery — Weight 7 tons. Speed 12 m.p.h. (This type can pull its own weight at this speed on good roads).
Heavy Artillery — Weight 15 tons. Speed 12 m.p.h.

In addition to these caterpillar tractors, designs of self-propelled mountings of the Holt type and Christie type have been made as follows :—

1. 75$^{m/m}$ gun and 105$^{m/m}$ howitzer interchangeably. This carriage has a maximum speed of 30 m.p.h. on a 45° slope and weighs complete 5¾ tons. This equipment did a 120 mile march over heavy country at a normal speed of 15 miles per hour developing a maximum of 30 m.p.h. The firing tests were very satisfactory.
2. 4·7-inch gun and 155$^{m/m}$ howitzer interchangeably. Maximum speed 18 m.p.h., and weight complete 18½ tons.
3. 155$^{m/m}$ gun and 8-inch howitzer interchangeably. Maximum speed 15 m.p.h., and weight complete 22 tons.

The Christie type has been designed and manufactured for the 155$^{m/m}$ gun.

Speeds as high as 25 to 30 m.p.h., are now not considered either necessary or desirable. They involve the provision of a very powerful engine with consequent increase in weight, and further it is found

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that they result in almost prohibitive maintenance costs due to deterioration of the track.

In both of these types an effort has been made to render them amphibious by waterproofing the engine by either :—

(1) Separately proofing certain vital parts.

(2) Completely enclosing the engine in a waterproof casing.

The first method has proved to be a failure due to vibration on the roads which breaks down the tightness of the waterproof joints.

To illustrate the advance which has been made in mechanicalisation of artillery, the test carried out in America in 1922 may be cited. In this test ten 5-ton and twenty-eight 10-ton tractors (of the original type) were used to convey eight 155$^{m/m}$ G.P.F. guns and six 8-inch howitzers with platforms, a distance of 600 miles over a variety of country, some being of very bad type. The trip occupied 40 days, of which 31 were spent in travelling, giving an average of 19½ miles per day; the longest one day run was 40 miles by the whole train, and on one occasion a 10-ton tractor towing a 10-ton trailer ran 83 miles in 30 hours. The whole column was entirely self contained and consisted of three convoys: (1) Provisioning, (2) Guns and Tractors, (3) Bridging and route maintenance. All repairs were carried out en route and only one tractor was abandoned at an Ordnance Depôt for special repair.

The total of vehicles of all sorts excluding the tractors was 265 and the personnel (including the gun convoy) 26 officers and 1030 other ranks.

The accompanying Table A, gives the main characteristics of typical field gun and howitzer equipments. In the case of medium and heavy artillery, designs are not sufficiently advanced to permit of any tabulation.

In the case of the 75$^{m/m}$ gun the M.V. is for a supercharge, but in considering the equipment it must be taken into account that it has a possible range of over 15,000 yards.

It is evident that great strides have been made both in regard to range and arc of fire.

The weight in action of the American 1921 box trail equipment seems extraordinarily low, but the figures are as published. There is a steady diminution in wheel diameter and increase in track, and a simultaneous decrease in the number of rounds carried with the gun. These alterations (which would be more marked if comparison is made with the older B.L. types) are a direct result of increased ballistics.

The great increase in efficiency in design is very clearly brought out in the last two lines of the table.

Weight will always be of importance in field artillery guns and howitzers, which in action have always to be light enough to be handled by a limited number of men, and such advancements as increased elevation and traverse, independent line of sight and quick loading gears, all add weight, quite apart from increased M.V. and muzzle energy. The advent of mechanicalised field artillery has not done away with the old limiting weight factor, except possibly in the case of self-propelled mountings.

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It is, however, in the class of medium and heavy artillery that the greatest strides have been made. Prior to the war, it was hardly considered as within the bounds of practicability to design wheeled artillery of calibres up to 6″ and 9·2″ howitzers to accompany the field army. The Germans and Austrians, as is well known, had manufactured heavy guns and still heavier howitzers which although transported in loads fired off their own wheels, and the French also had a limited number of heavy pieces. And the large variety of medium and heavy guns and howitzers which appeared as emergency measures during the war proved not only the necessity but the practicability of this type of artillery. It must not be forgotten, however, that without efficient tractors or other mechanical transport the present day evolution of heavy artillery would not have been possible.

In considering the general advance in this class it will suffice to compare the following pre-war and post war designs. (See Tables A & B).

The immense increase in effectiveness of corresponding calibres is very evident. The last column in Table B, as well as that in Table A, brings out very clearly the effect produced by various developments.

The criterion of ft./lbs. of M.E. per lb. of the equipment serves as a very useful comparison but requires discrimination in its application. The sudden drop from 535 to 361 in columns 4 and 5 of Table B does not indicate a falling off in design, but is wholly accounted for by the heavier ballistics of the gun and the increased arc of fire. Columns 5 and 6, however, are directly comparable, the improved efficiency being due to changes in the design of the carriage, details of which have been mentioned.

Perhaps the best example of progress, however, is a comparison of the British 9·2-inch howitzer and the American 8-inch howitzer. The M.E. of these equipments respectively are 455 and 517 ft./tons, the latter having an increased range of 5,000 yards and travelling in two loads, besides firing off its own wheels. The efficiency has risen from 196 to 425.

In Table A, it will be noticed that the figures are approximately the same for the French, British, German and American gun equipments of pre-war design. The later American equipments show greatly improved efficiency due almost entirely to the very large increase in M.E.

Development on the carriage side since 1914 has been very rapid. The milestones, so to speak, may be marked by the advent, firstly, of the French 75$^{m/m}$ in 1897, followed in 1912 by the first split trail equipment, the Italian 75$^{m/m}$, designed by Col. Deport the originator of the French "75", and finally the G.P.F. type produced in 1918 by Col. Filloux. The year 1897 saw the first true Q.F. carriage with H.P. recuperator, subsequently adopted after many years by ourselves and America, whilst the Deport type split trail for field artillery, and the G.P.F. for Medium and heavy, have immensely increased the effectiveness of these natures.

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TABLE "A"

	FRENCH.	GERMAN		BRITISH.		AMERICAN.					
	75 mm.	96 n/A	F.K. 16	18 pdr. Mk. 1 Gun.	4.5 in. how.	3 ins. gun	75 mm. gun.	75 mm. gun.	75 mm. gun.	105 mm. howr.	105 mm. howr.
Date	1897	1905	1916	1905	1911	1902	1920	1921	1923	1920	1921
Calibre in inches	2.95	3.03	3.03	3.3	4.5	3	2.9	2.9	2.9	4.2	4.2
Bore length, calibres	34.5	27.3	35	28	13.3	28	42	42	42	31	—
Weight of shell, lbs.	15.9	15	15	18.5	35	15	15	15	13	33	33
M.V. (f.s.)	1740	1525	1745	1615	1010	1700	2175	2175	2175	1500	1500
M.E. (ft. tons)	336	244	320	335	250	301	495	495	495	520	520
Weight of gun	9.1	7.66	—	9	9	7	11	8.5	8.5	11.25	9
Weight in action	25.8	19.3	27.5	25	27	22.5	32.5	25	28	33	27
Weight in draught	39.5	35.6	45	40	41.5	33.8	43	35.5	39	—	—
Range (yards)	6900	8800	10400	6500	7000	6000	15000	15000	15000	12000	12000
Elevation	19°	16°	16°	16°	45°	15°	80°	45°	45°	80°	52°
Traverse	8°	8°	8°	8°	6°	8°	30°	10°	45°	30°	10°
Diameter of wheels	52′	53″	53″	56″	56′	56″	48′	48″	56″	48′	48″
Track	61″	60″	60″	63″	63″	60″	60″	60″	60″	60″	60″
Recoil	47	44	—	41	40/20	46	40/18	42		45	45
Pounds M.E. per lb. Action ...	260	252	232	268	185	268	313	400	353	316	386
,, ,, ,, Transport	170	136	142	167	120	—	232	282	254	—	—

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TABLE B.

	BRITISH.			AMERICAN.					
	60-pr. Gun. Mark I.	6-in. 30-ct. How. Mark I.	9·2-in. How. Mark II.	4·7-in. Gun. 1906.	4·7-in. Gun. 1920	4·7-in. Gun. 1921	155 m.m. How. 1920	155 m.m. Gun. 1920	8-in. How. 1920
Weight of Shell ... ... (lbs.)	60	100	290	45	50	50	100	95	200
M.V. ... ... (f/s)	2080	777	1500	2050	1850/2450	2450		2000/2800	1925
Range ... ... yards	10000	5200	13100	8860	20500	20500	16000	26000	18000
Arc of fire	8°	Nil.	60°	8°	60°	60°	60°	60°	60°
Loads in Transport	1	1	4	1	2	1	2	2	2
Weight in Action	4t. 8c. 11lb	2t. 17c.	14t. 17c.	3t. 12c. 21	5t. 16c.	4¾ tons	6 tons	10t. 14¼c.	12t. 4c.
Total Weight in Draught	5t. 4c. 2q.	4t. 5c. 2lb.	18t. 18c.	4t. 7c. 3q.	7t. 18c.	5t. 7c.	7t. 1c.	12t. 10c.	12t. 8c.
Ft/lbs. M.E. per lb. Weight in Action	412	147	196	535	361	442	—	487	425

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GERMANY TO-DAY.

GERMANY is so much in the public eye at present that a résumé of the present state of that country may be of interest, not only to candidates for the Staff College, but to the Regiment at large.

An attempt has been made in the following pages to avoid controversial matter and theory, which would be out of place in a military publication.

I. THE ARMED FORCES OF GERMANY.

The regular armed forces of Germany are limited by the Treaty of Versailles, as interpreted by subsequent decisions of the Supreme Council, the Conference of Ambassadors and Inter-Allied Military Commission of Control in Germany.

The Army.

The supreme command of the defence forces of Germany is vested in the President of the Reich. The Minister of Defence (Reichswehrminister) is responsible to the President; the Commander-in-Chief of the Army (General von Seeckt), although answerable to the minister for his command, can only be removed from his post by the President. The various state war ministries were suppressed by order of the Allies, as was the existence of the Great General Staff as an entity separate from the Ministry of Defence.

The army (Reichsheer) consists of 96,000 men, 4,000 officers, 300 medical and 200 veterinary officers only.

It is recruited by voluntary enlistment, as are the Navy and Police, officers engaging for 25 years, other ranks for 12 years. The uniform is the field-grey so familiar in the Great War.

The reduction of the army gave an opportunity for selection, which was taken full advantage of in regard to the officers. The present small army is well trained and efficient, and would be a very serviceable cadre. All traces of communism appear to have been eradicated and the Nationalist spirit is carefully fostered in the army.

Sports, especially football and athletic sports, are much encouraged.

All details of armament and equipment have been laid down by the Allies, who have forbidden aircraft, tanks, armoured cars and gas.

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The field army is equipped with 288 pieces (4·2″ howitzers and 77$^{m/m}$ field guns) with 6 in reserve. The fortress of Königsberg is allowed 22 guns (from 10 to 21$^{c/m}$ calibre) on fixed mountings, with two spares, and 16 anti-aircraft guns with one in reserve.

The army is organized in seven infantry and three cavalry divisions grouped in two corps (Gruppenkommandos), and one independent (Bavarian) division in accordance with the Treaty.

The 1st Division and Cavalry Regiments 1 and 2 are stationed in East Prussia, being thus detached from the rest of the army.

The remainder of the first two cavalry divisions are stationed within reach of the eastern frontier, which offers wide stretches of country suitable for cavalry work. The 3rd Cavalry Division (of only 5 regiments, the Bavarian regiment being attached to the 7th Infantry Division as noted) is stationed in the West of Germany. The three cavalry divisions have each a horse artillery group consisting of headquarters and three batteries, each of 4 field guns (77 $^{m/m}$ calibre).

The 21 infantry regiments are evenly divided between the 7 divisions.

The General Officer commanding an infantry division is also the commander of the divisional area; the numbering of these corresponds to that of the infantry divisions. He is assisted by a somewhat numerous staff including divisional, infantry and artillery commanders, who are usually major-generals.

Each artillery regiment consists of 9 batteries in three groups and a training battery.

There are also 488 coast defence guns (calibre 3·7 to 30·5 $^{c/m}$) and 554 naval ships' guns of various calibres.

Thus Germany is authorized to have 1,401 guns, mostly of small calibre, including all guns mounted on ships and fixed mountings.

The stocks of ammunition authorized would be fired by the above guns in one day at the rates of consumption usual in modern battles.

Germany is allowed 310 trench mortars of which 258 belong to the army; there is one mountain trench mortar company.

On the whole the morale of the Reichsheer is very good and the standard of training is fairly high. There can be no doubt that Germany's escape from the internal disintegration, so largely prophesied for the past winter, was in no small measure due to the efficient performances of the Reichsheer as an instrument of public order.

Navy.

The navy has been reduced by the treaty of Versailles to the standard of a third-rate power and there is no need to go into details with regard to it. These can be found in the Treaty, a copy of which should be in every library.

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The Police.

Much has been made of the German police (Schutzpolizei or Schupo) as a military force. The facts are as follows :—

The total number of police allowed to Germany (a nation of 62 millions) is 150,000. This includes all categories of police (criminal detectives, licensing, inspecting, administrative, &c.), except rural gendarmes (Landjäger); only about 90,000 to 100,000 are the so-called Schupo. The last-named force are armed constabulary, whose chief duty is the maintenance of order in the towns. The authorized armament includes 150 armoured cars, 53,000 rifles or carbines, 340 heavy machine-guns and 7,500 automatic machine-gun pistols, also short pistols, swords, and hand-grenades.

There are also some motor-launches for the water-police. No guns, trench-mortars, aircraft or transport are allowed. The organization of the police is not yet in accordance with Allied directions, but, allowing for German national characteristics and the fact that all its organizers have received their training in the army, the police cannot be said to be particularly military. A study of the distribution of the police force will show that it is perfectly logically concentrated in the areas of dense population and more sparsely distributed in the agricultural districts. The police are state, not federal, forces and are allotted to the various states in proportion to their size; in each case the police are under the state minister of the interior.

It has been laid down that the police shall do no military training. While there is no doubt that there have been instances of combined training by police and the army, most of the "military training" done by the police is confined to the handling of their arms and to operations for restoring order in disturbed districts, such as they have had to deal with on several occasions in the last six years.

Another police force which should be mentioned is the Landjägerei (rural police), 17,000 strong. This is a very fine body of men, but they are not numerically important, nor does the nature of their duties permit of their organization in formed units, while a large proportion are far from young.

Reserves.

It will be seen from the above that, on mobilization, if Germany entirely denuded herself of her armed police and scrapped her navy, she could only put into the field authorized forces amounting to some 185,000 men quite inadequately provided with artillery and with no modern equipment such as aircraft and tanks.

When we come to consider the question of potential reserves, however, we see a very different picture; but one which is too complicated to be easily appreciated in all its details.

The population of Germany at the present time is about 62,000,000, and it is probable that about 6,000,000 men are fit for active service.

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Of these it is estimated that some 4,700,000 were trained in the war or in the various military bodies, regular and irregular, which have existed in Germany since the armistice. There is, therefore, no shortage of reserve man-power in Germany and the population is increasing at the rate of some half million per annum. Even the trained reserve, applying that term to all who have been through any military training, will be fairly considerable for some years to come. In addition, there is no doubt that a certain amount of military training of youths has been going on, chiefly in Bavaria and East Prussia, although the extent of this breach of the Treaty of Versailles is often exaggerated in the Press.

Without going further into the matter, it is obvious that Germany has the men to form a large army if she can organize and arm them.

In a country like Germany, which swarms with clubs, unions, old comrades' associations, and societies of every kind, amongst a people to whom organization is an essential part of life, it should not be difficult for the army command, assisted by the numerous retired staff officers, who now swarm in all these associations, to work out on paper a scheme of mobilization. Whether such a scheme could be put into effect when required depends too largely on international politics to be discussed here. Another important factor will, however, be briefly considered later, to wit the national unity, which would be essential to such a difficult operation.

Reserve Armament.

In discussing the question of the quantity of arms now hidden in Germany one is on rather unsafe ground.

The disorderly manner in which the bulk of the German army returned after the war and the disturbed conditions then prevailing in the country contributed to an extensive dissemination of war material. Fortunately for the cause of disarmament, the extremists of the Right and Left have been the most energetic collectors and the largest holders of arms. Successive governments, fearing these extremists, have made more or less strenuous efforts to disarm them. Great quantities of arms have been collected in this manner, notably by a general sweep for arms undertaken in 1920 under pressure from the Allies.

Nevertheless, the events of the past troublous twelve months have shown that many irregular formations can produce some thousands of small arms of various kinds and even a few machine-guns. Rumours of concealed guns are always rife, but the only guns known to have been produced by these irregulars were those used by the Oberland Corps in the fighting against the Poles in Upper Silesia in 1920 and these were filched from a government destruction depôt in the neighbourhood. (A certain number of concealed guns have also been found, notably the much-quoted find in the Rockstroh factory in Saxony). In view of the bitterness of the fighting, not only

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against the Poles in Silesia, but between the German communists and government forces in April 1920 and March 1922, the Government forces being assisted on the former occasion by irregulars, it would be surprising, if concealed artillery were at all plentiful, that none was employed except by regular units.

However, all that one can say is that it may well be possible for Germany to produce at present a million rifles and carbines or even more, a few hundred machine-guns and a few guns. It is highly improbable that any tanks have remained concealed and serviceable and the same applies to aeroplanes, nor will any possibly concealed ammunition have improved much in the last $5\frac{1}{2}$ years. This is, it must be emphasized, pure guesswork. At the end of 1923 there were 128 aeroplanes in Germany, none of which were suitable for war, while 64 more were dismantled or in construction and there were 140 spare engines. It is stated that six aeroplanes were exported during the last quarter of 1923. The arming and equipping of a national army, except in the matter of transport, would certainly be a tremendous task for Germany to-day. It is probable that Germany, if free from interference, could even now bring her factories up to full production of war material (with the exception of a very few categories) in less than 12 months' work.

It is often said that Germany could obtain large supplies of war material from abroad. This will depend on the political constellations, which are continually changing, but it must be remembered that extensive foreign purchases necessitate extensive foreign credits and, until the international situation changes very considerably, Germany's chances in a new war will not be such as to encourage alien financiers to give her very good terms. Further, foreign governments will think twice before allowing their nationals to afford Germany such aid as might embroil their countries with that state's potential foes.

II. THE WORK OF THE COMMISSIONS OF CONTROL.

Reference must now be made to the work of disarmament carried on by the Inter-Allied Military Commission of Control in Germany since 10th January 1920 (the date of the ratification of the Treaty of Versailles). Since the French and Belgian forces occupied the Ruhr and other "sanctions" areas in January 1923, the opposition of the German government has held up this work, a foolish proceeding from the point of view of that government, which has to continue to pay all the expenses of the Commission until their work is done.

Up to that date, however, 337 allied officers (later reduced to 183, the present figure) superintended the execution of the military clauses of the Treaty of Versailles, without any immediate military support, in a country which has been steeped in militarism for more than a century.

Simultaneously Inter-Allied Naval and Aeronautical commissions superintended the execution of the naval and aeronautical provisions

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of the treaty. The naval commission has practically concluded its work in the naval establishments afloat and ashore, and arrangements for ensuring that the German navy remains in its present reduced state are now under discussion.

The Aeronautical Commission completed its task in April 1921, and was then replaced by an Inter-Allied Committtee of Guarantee (paid for by the Allies) whose duty it is to see that German aircraft factories observe the regulations designed to prevent the production of machines suitable for use in war, that the government forces do not again become possessed of any aircraft and that the other permanent aeronautical provisions of the Treaty of Versailles are observed.

The military commission under General Nollet (France) was subdivided into three sub-commissions. 1. Armaments, under Major-General the Hon. Sir F. R. Bingham, K.C.M.G., C.B., 2. Effectives, under General Barthélemy (France) and 3. Fortifications, under Colonel Bizouard (France).

For the purposes of control work, the whole of Germany was divided into districts, each of which was worked by district committees of the various sub-commissions. The headquarters of the commission are established in Berlin, while the district committees live in convenient towns in their respective districts. The German government provides the necessary quarters and offices.

A brief recapitulation of the work achieved up to January 1923, by each of these sub-commissions, which were composed of French, British, Italian, Belgian, and Japanese delegates, and were to have included Americans, will throw some further light on the present military position in Germany.

1. *The Armaments Sub-Commission* have, with certain exceptions, reduced the armament and equipment of the German army to the scale drawn up in minute detail by the sub-commission for the 100,000 army; the armament and equipment of all categories of police, again with small exceptions, have been reduced in accordance with Allied prescriptions; and enormous quantities of arms have been collected from the civil population. Nearly all the arms and equipment collected have been destroyed in depôts maintained by the German government and supervised by Allied officers.

6,935 factories, which produced war material during the late war, have been inspected and the sub-commission has given instructions for their conversion to peace-time production. 6,743 of these factories have been finally passed as now in conformity with the sub-commission's demands.

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The Progress made in the surrender and destruction of a few categories of arms and equipment up to April 12th, 1923.

Guns and howitzers (all calibres).	Surrendered.	Destroyed.
Guns and howitzers (all calibres) ...	33,550	33,516
Artillery ammunition ...	10,678·3 tons and 38,107,604 rounds	10,678·3 tons and 38,101,026 rounds
Trench Mortars	11,616	11,615
Machine-Guns	87,950	87,946
Small Arms	4,560,861	4,553,907
Small Arm Ammunition	459,903,800	456,078,800
Flame-throwers	1,072	1,072
Armoured trains	31	31
Tanks	59	59
Observation wagons ...	1,762	1,762
Wireless sets	8,982	8,972
Field Bakeries	1,240	1,240
Pontoons	2,199	2,196
Personal Equipment	981·7 tons and 8,049,092 sets	920·6 tons and 7,885,148 sets

2. *The Effectives Sub-Commission* has reduced the German army to 96,000 men with 4,000 officers (the present strength is below establishment), 300 medical and 200 veterinary officers.

The police have been reduced to the strengths quoted above and their organization considerably modified with a view to depriving the force of a military character, although the allies are not yet satisfied on this score.

The German government has been made to break up the Einwohnerwehr (Inhabitants Guard) and kindred irregular formations, as well as members of militarist societies, though it must be admitted that the latter rival the phoenix and the chameleon for re-appearing under new guises.

Various legislative and administrative measures have been taken by the German government, at the instance of the Commission, to abolish the facilities and powers which formerly existed for mobilization.

3. *The Fortifications Sub-Commission* has superintended the destruction of all fortifications and structural facilities for mobilization west of a line drawn 50 kilometres east of the Rhine. The fortress of

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Königsberg in East Prussia, which was allowed to be retained as a defence against a possible Bolshevik advance, and certain fortified coast defences are the only armed fortifications remaining; but the works of the southern and eastern frontiers of Germany are to be maintained in the state in which they were in 1918. The work of this sub-commission is now complete and it has been closed down.

Methods of Work.

It may be of interest to indicate very briefly the normal method of work followed by the Armaments and Effectives sub-commissions. The reductions in personnel and armament and equipment, the re-organizations and other measures to be taken, are announced to the German government by the Inter-Allied Military Commission of Control Headquarters through the head German liaison office. The execution of these measures is checked by the district officers, who carry out personal inspections of the units, headquarters, factories, and German destruction depôts involved. The district committees also lay down details of the alterations to be carried out in factories, which have been engaged on the manufacture of war material, etc. The Allied officers are nearly always accompanied by German liaison officers on visits of inspection, these visits being announced to the local liaison office in advance. When it is considered advisable to carry out a surprise visit, the liaison office is only requested to send an officer to the starting point at a certain time.

It is difficult for anyone who has never been engaged on work of this description to form a just idea of the work involved in carrying out the tasks so briefly sketched above. It has often been done in the face of opposition both open and covert and there have been several instances of personal violence being offered to members of the Commission.

Some of the stations in which Control officers have found themselves offer golf, sailing, shooting or fishing; in nearly all can tennis be played and football and cricket are played in Berlin; some riding is obtainable there and in other places. Opera and theatres are available in most towns and were cheap until recently. The old towns and scenery of many parts of Germany are too well-known to require any reference.

Nevertheless, the atmosphere of hostility, which is often encountered (although less marked towards British than some Allied personnel and at times quite unnoticeable), and the continual contact with Teutonic intellects and mentalities, which are not very attractive in the mass in spite of some great qualities, are features which tend to make the life less attractive as time goes on. For this reason, and in accordance with the principle that officers should not be absent from their regiments for too long at a stretch, several reliefs are now being effected amongst the British personnel.

Control Work and future Plans.

The obstruction to control, referred to earlier, increased to such an extent during 1922 as to cause the Allies to make representations

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to the German government on this head, and on 29th September, 1922, an Allied Note enumerated five chief categories of the Commission's work which remained incomplete and offered to replace the Inter-Allied Military Commission of Control by an Allied Committee of Guarantee (to be paid for by the allies), when work under these heads should be finished, provided that the German government gave its consent to the establishment of this committee. Under Article 213 of the Treaty of Versailles, the permanent supervision of the maintenance of the military status imposed on Germany by this treaty was to be entrusted to the League of Nations. It is not considered that the League is at present in a position to undertake this task with advantage, it is therefore necessary to arrive at some interim arrangement, which must therefore be negotiated with the German government. This note remained without a satisfactory answer, until the events consequent on the occupation of the Ruhr held up Control matters. The question is now being re-opened and it is hoped that some arrangements may be made to attain some finality in this legacy of the war. Unfortunately the imminence of elections in several of the countries chiefly concerned complicates the attitude to international questions of the politicians in power in these lands.

It may, however, be of interest to set out shortly the Allies' demands contained in the latest note. First the German Government is to facilitate a series of visits designed to ascertain whether the military position is the same as it was when Control work ceased in January, 1923. The work is then to be concentrated on the five categories of work referred to in the note of 29th September, 1922, quoted above, which were as follows :—

1. The re-organization of the police (article 162 and decision of the Boulogne Conference, June, 1920).

2. The transformation of the factories (article 168).

3. The surrender of the remaining unauthorized war material (article 169).

4. The surrender of documents relative to the stocks of German war material at the time of the armistice and to the output of German factories during the war and after the armistice (article 206, paragraph 2, and article 208, paragraph 4).

5. The promulgation of legal texts (legislative or administrative as the case may be), necessary in order :

(a) To forbid effectively the import and export of war material (article 211 in conjunction with article 170).

(b) To bring the recruiting and organization of the army into harmony with the military clauses of the peace treaty (article 211 in relation to articles 160, 161, 173, 174, 175 and 178), particularly as regards repealing the various measures which are still foreseen and which relate to mobilization.

On the completion of these it is again suggested that the Commission be replaced by a Committee of Guarantee financed by the

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Allies until such time as it may be judged convenient for the League of Nations to take over the supervision of German armaments, as foreseen in Article 213 of the Treaty of Versailles.

Unfortunately, at the moment of writing, the attitude of the German government is purely negative, which is not very conducive to a feeling of confidence on the part of the Allies in Germany's determination to adhere to her pledges. It is however to be hoped that the responsible men in Germany will realize that there is nothing to be gained and everything to lose by obstruction at this stage and that, in spite of the imminence of elections and the vociferations of a noisy minority they will complete the policy embarked on and facilitate an early return to normal conditions.

III. INTERNAL SITUATION.

In considering the military possibilities of a country, considerable attention must be paid to the general internal condition of the country and this must be considered from the political and the financial-economic standpoints.

It is probable that the expert committee's report on the financial-economic position of Germany will have been published before this appears in print; in any case, this position changes very rapidly. Only the briefest reference will be made to it here.

As a consequence of the Treaty of Versailles, Germany lost :—

All her colonies and 12% of her territory in Europe.

Over 90% of her merchant marine.

The bulk of her wealth abroad.

80% of her iron, 75% of her zinc ore, and nearly 30% of her coal (German official figures).

Nearly 20% of her potato and 15% of her cereal producing land.

Various rights in China, Siam, and all Allied states.

Very large quantities of reparations in kind ranging from works of art and 5,000 railway engines to 180,000 cows, and 12,500 harrows.

Large quantities of coal, tar, chemical products, etc., in annual instalments.

Germany is faced by a reparations account of unknown extent.

Her currency has depreciated "right off the map"; the causes of this depreciation are too intricate and controversial to go into here.

France and Belgium hold the most valuable industrial region in the country severed from the Reich.

On the other hand, unemployed relief work has been directed to improving the communications of the country, and the profits made by factories and mines have been put into renewals, extensions and improvements of plant and premises to escape taxation.

The conditions, which have obtained in Germany during and since the war, including ill-directed efforts at socialist legislation, have conduced to the impoverishment of the masses and to the benefit of the few. While these few have been in part mere profiteers, who are now

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flaunting their gains in the face of the world, huge funds have been amassed in the hands of the most capable industrial leaders in Germany.

These circumstances are conducive to a great industrial recovery on the part of Germany as soon as the Franco-Belgian stranglehold on the Ruhr is released. In many directions, notably in shipping, this recovery is already apparent, having been much aided by the low wages obtaining in the country.

In spite of her losses, Germany is still possessed of very great natural resources and she has an excellent system of communications and plentiful industrial plant. Above all she has a hard-working, thrifty population, which appears to have tired of work-restricting socialist experiments and which is strongly imbued with the will to pull through the present difficulties. Under these circumstances, it would seem that Germany is assured of a great future.

The Political Situation.

Students of British political life, who are easily upset by the advent to power of a third party and to whom a coalition is anathema, cannot easily visualize the kaleidoscopic effects of German political history since the revolution of November 1918. Parties have arisen, waxed, waned, and disappeared (or have merely appeared and disappeared) with startling rapidity, owing their origins to needs, real and imagined, to personal ambitions, or to evanescent popular fads. About 22 parties put forward candidates at the elections held in June 1920, and of these 12 secured representation in the Reichstag which has just been dissolved. The next elections are fixed for 4th May and two or three more parties are expected to compete than on the last occasion.

The reactionary movement is primarily directed to setting up a strong government in the place of the succession of (in the view of the paladins of the Right) feeble and unpatriotic cabinets. The government of the Right would, they claim, restore normal conditions internally and, by taking a strong line in foreign affairs, regain for Germany her international standing.

The question of the restoration of the monarchy is kept in the second place, because it is realized that favourable conditions are essential to popularize any new form of government and because there are great difficulties inherent in the problem of restoration. These difficulties relate to the choice of a suitable monarch. Nearly all Bavarians, most other Roman Catholics, and many other South Germans favour the selection of Prince Rupert of Bavaria. The remaining monarchists wish for a Hohenzollern to reascend the German throne, but very few desire the return of the ex-Kaiser or even of the Crown Prince, though the latter is gaining in popularity. There is little question of the restoration of the twenty odd minor dynasties. A plan much favoured in monarchist circles is the proclamation of the eldest son of the Crown Prince as King with a "strong man" as

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Protector, the new constitution being modelled on that of Great Britain. The "strong man" has not yet been discovered, unless he be General von Seeckt, the commander-in-chief of the army and an exceedingly capable man.

The antagonism of the Right and Left was well epitomized in a Press cartoon some months ago, which showed two armed groups of typical protagonists of reaction and Bolshevism glaring at each other and both exclaiming "*We* are all for peace and order—but those blighters on the other side!"

These extremists' hatred of each other is bitter and deep, but the hatred felt for the country which Germans regard as their chief tormentor, France, and after her for the Allies at large, grows steadily. While the Allies can have no interest in interfering in purely domestic German politics, they cannot tolerate the formation of armed organizations, which, nominally collected for civil strife, might in the future be used as the basis of a national army to fight the common external foe in an effort to upset the Treaty of Versailles.

In a sketch as brief as the present one, it is only necessary to refer to two more features of the political situation.

Firstly there are various separatist movements, which are, for the most part, more correctly described as movements for autonomy.

The Republican constitution of Weimar abolished the greater part of the prerogatives enjoyed till then by the various constituent states of the German Reich (realm). It was the deliberate policy of the then powerful Socialist party to centralize the government in Berlin.

Various states, notably Bavaria and more recently Saxony, have strongly opposed this centralization and wish for a revision of the constitution which would endow them with at least the same powers as before.

There is also a movement for decentralization in Prussia, the largest state in the Reich. That in the Rhineland, owing to its international importance, has gained the most notice and has been adequately commented on in the British press.

In the old kingdom, now province, of Hanover a small but active party demand a separation from Prussia.

The province of Silesia has put forward demands for a measure of local autonomy and the demands have been not unfavourably received. A movement for local self-government in East Prussia, on account of the isolated position of that province, appears to have died down.

The second feature to which reference must be made is that of irredentae. Leaving on one side the question of lost colonies and the requirements of an expanding population (which could not be met by those colonies in any case on account of their situation) and even that of Alsace-Lorraine, the alienated territories, which Germans claim as naturally theirs, are considerable.

The case with regard to the northern zone of Schleswig-Holstein, which went to Denmark, is very weak; but German claims to parts of the territory ceded to Poland and to the Free City of Danzig may be considered to have some foundation, while the territories in the west

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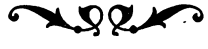
occupied by the Allies are a fruitful theme for patriotic propaganda.

In addition, the Germans in Austria and in Bohemia, are regarded in Germany as outposts of German culture and national ideals, although the movements in favour of uniting their territories to the Reich have died down for various reasons, of which the chief was the veto of the allies. The internal situation in Germany, which has been sketched so briefly, is even more dependent on foreign political factors than that in most countries. These factors are, however, too intricate and delicate for discussion in the scope of this paper.

It may yet be possible to achieve some solution of European and world problems which will produce that moral disarmament of Germany and other nations, which alone of all forms of disarmament can be effective. This moral disarmament can, however, only be achieved by removing the main incentives to war. Any arrangement directed to this end must therefore take into account the legitimate economic, political, and racial interests concerned and include a serious attempt to solve the problems of all the countries affected and not only those of one group.



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THE INFANTRY ACCOMPANYING GUN.

Reprinted from "Quarterly Summary of Artillery Information," No. 10, 1923.

THE General Staff has had under consideration the two questions of :—

(a). A suitable artillery weapon for the close support of infantry.
(b). The most suitable weapon for defence of the forward infantry against tanks.

The conclusion arrived at is, that, for the present, the 3·7″ howitzer, adapted to fit these rôles with split trail and wide traverse (40 degrees), and comparatively heavy shell (20-lb.) can fulfil both functions. The immediate requisites are :—

(1). A modification on occasions of the means of transport and of the carriage of ammunition, principally to render the sub-section more inconspicuous in action and in the approach to action.
(2). An organization suitable to and within the Infantry Division.
(3). A projectile capable at reasonable ranges of rendering innocuous any tank likely to be produced in the near future.

As regards (1) the Southern and Aldershot Commands are each carrying out a continuous trial with an equipment with "shortened shaft draught," which is drawn by one mule. The rear (or spade) portion of the jointed trail of the carriage is removed and the front portion is fitted with shafts which have an attachment for "farmers' draught," the saddle and harness being also modified. The shield is removed as also, to avoid damage, is the traversing gear, and the weight behind the mule is approximately 10-cwt. By this method the carriage on which the howitzer is mounted is followed by the mule carrying "trail, rear portion" by the "shield and slipper" mule carry the shield and traversing gear, and by three ammunition mules each carrying eight complete rounds in two ammunition boxes. Thus the piece can be brought into action rapidly and with a reasonable amount of ammunition.

2. The carriage of the 3·7″ howitzer was not designed to stand continual travelling on its own wheels, which causes greater stresses than those due to firing; but trials have shown that few modifications are necessary to render the equipment capable of such movement. These modifications are under consideration.

An establishment has been drawn up for the battery which permits a ready change from pack to draught and vice versa.

Five mules are allotted to each sub-section, which, with the three with the piece when in draught provide the eight required to transport the howitzer and carriage in pack. These five mules are intended to be used for ammunition supply in action, and in this connection modified saddles and ammunition boxes are being considered.

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The remainder of the ammunition with the battery (90 rounds per gun) and the veterinary, artificers, and signalling stores (with the exception of one mule per section with telephone gear) are carried in L.G.S. wagons. A water cart, mess cart, and kitchen, travelling, are allotted to each battery and a mess cart and Maltese cart to brigade headquarters.

One pack brigade of three batteries will be included in each division, and the batteries (which can each be affiliated to an infantry brigade when desired) are organized with headquarters and two sections, each of two howitzers. Each of these sections represents a complete artillery fire unit (a "2-gun battery") and is organized for independent action, having two officers and an ample staff for reconnaissance, observation and signalling.

Consequent on this divisional organization a pack artillery section is included in the divisional ammunition column (L.G.S. wagons carrying 90 rounds per howitzer); the signal section is provided in the divisional signals and the necessary additions are made to the divisional train.

3. In addition to the need of a projectile (H.E.) capable of dealing with enemy tactical points which may hold up the advance the "infantry accompanying" weapon may require a purely man-killing projectile such as shrapnel.

The question as to whether this nature of projectile shall form part of the equipment ammunition for this weapon has not been definitely decided, but it will certainly be required on occasions.

The main points to be considered in regard to the use of shrapnel are :—

(a) The muzzle velocity of the howitzer should be such that the remaining velocity at a medium range will be sufficient to induce in the bullets the striking energy requisite for man-killing.

(b) The pressure in the howitzer must be sufficient to cause the selected fuze to "arm".

With existing fuzes these conditions are only obtainable in the 3·7″ howitzer with the fifth charge (maximum muzzle velocity). The No. 80 fuze is better in these respects than the No. 88, and has, for reasons of economy and simplification of supply, been accepted as the fuze to be used for the present.

It is however, recognized that with lower charges and greater height of trajectory the carriage is less unsteady and the difficulty of clearing crests is reduced, so that a newer design fuze is under consideration, which it is hoped will meet requirements.

A fuze indicator for fuzes No. 80 and No. 88 has been produced. (Quarterly Summary, No. 9).

4. In Quarterly Summary, No. 9, a penetration table has been included which shows that provided the shell does not detonate the 3·7″ howitzer projectile with a graze may be expected to penetrate a 1-inch plate at 30 degrees to the normal at a range of 1,200 yards full charge.

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Actual trials have taken place and penetration at 30 degrees to the normal has been effected through a half-inch plate with a plugged lyddite shell (fitted with burnt-out fuze), and with a lyddite shell with 101 B fuze at some 1,350 yards at a velocity representing the remaining velocity with full charge.

The 1-inch plate has not been actually penetrated at this range and from the results of recent trials, it is doubtful whether penetration will be obtained with ordinary design of H.E. shell. To avoid detonation some form of plugged shell would appear necessary thus complicating the difficulties of what is already a somewhat meagre supply of H.E. and shrapnel.

It has however, been shown from recent trials, an account of which is given in Quarterly Summary, No. 11, that it is not always necessary to penetrate the armour in order to render a tank ineffective; but that the detonation of a 3·7″ H.E. shell against or under the tank will often suffice to stop it and enable it to be dealt with at leisure.

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INTERCEPTED CONVERSATIONS—No. 2.

Reprinted from "Quarterly Summary of Artillery Information," No. 10, 1923.

The previous conversation (Q.S. No. 9) having elicited some useful information, the Infantry Brigadier thought he would return to the charge, hence the following :—

Infantry Brigadier. And now talking about smoke, what are you fellows doing about that sort of thing these days? As far as my recollection of the great war goes you only used to fire it out of certain guns, and it always struck me that the screens you used to produce were rather ineffective.

Gunner Colonel. Isn't that rather a sweeping statement, Sir. Of course, you must remember—

I.B. Yes, I know what you are going to say. You never had enough of it. Perhaps that was so. But I'm looking at it from the infantryman's point of view. It is not pleasant to have to advance against an objective some hundreds of yards away, thinking oneself comparatively secure behind a smoke screen only to find that in a short while the screen lifted, leaving one with perhaps two or three hundred yards to cover without any form of concealment.

G.C. Yes, I'm afraid it was not very good, but you know—

I.B. You see you always had to put the screen so far away from the target; a screen that has to be put down several hundred yards short of an objective and which must be lifted when the troops get within 200 yards of it can scarcely be called efficient. Let me see, what is the actual distance you have to put the screen short of an objective in a following wind of an ordinary speed?

G.C. Four hundred yards, Sir, in a wind of from 8 to 16 m.p.h., which is the most favourable wind velocity for screen purposes.

I.B. Four hundred yards—Ye Gods! that means that, taking into account the 200 yards for the 100 per cent. zone of the gun, from 600 yards to the objective the infantry must advance over possibly open ground without any concealment whatever except what he can provide with his own smoke grenades. Incidentally I hear that the 3-inch mortar has also been withdrawn from battalions so we haven't even got that now for smoke purposes. Haven't you fellows done anything since the war to improve the shell or the smoke or something and try and give us a better screen?

G.C. As a matter of fact, Sir, we've done a good deal, but the results are still so inconclusive that nothing very much has been published about it. What has actually happened is this :—

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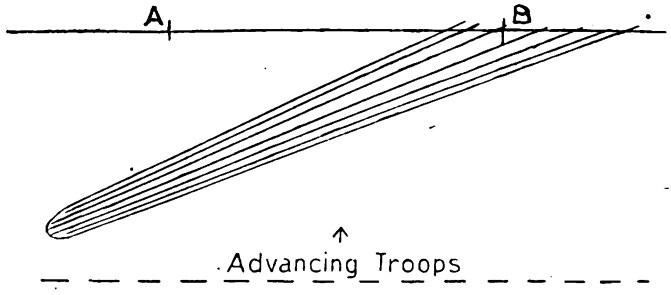
Towards the end of the war people began to say that the smoke shell of all natures was not so good as it might be. The chief complaints were that the smoke was produced too quickly, did not last long enough and was carried up into the air instead of remaining close to the ground. The smoke descended again some few hundred yards farther on, but by that time it had lost a certain amount of its value.

I.B. Then that is the reason why you have to put your screen so far from the target?

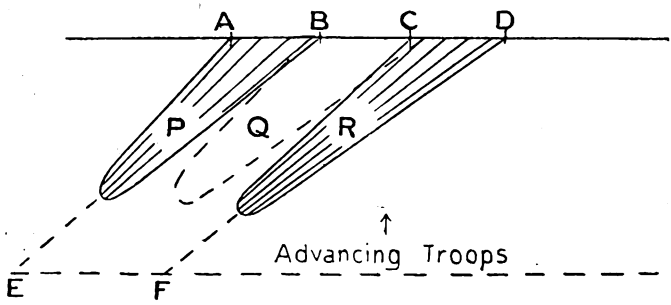
G.C. Exactly, and the distance you put it from the target depends on the strength and direction of the wind. As I said just now the distance for a following wind of 8 to 16 m.p.h. that the M.P.I.[1] should be short of the target is 400 yards. Similarly in an enfilade wind the M.P.I. must be 200 yards up wind of the flank of the object to be screened.

I.B. Then presumably in an oblique wind you take a mean between the two.

G.C. Yes. Of course, one has to combine the required distance short of the target with the necessary distance up wind to a flank, taking care that no gaps are left in the screen. If the angle made by the wind direction with the front to be obscured is small and the extent of that front is also small, the problem is easily as for a flank wind :—



But with an angle of about 45 degrees the diagram becomes :—



Although smoke screens P and R as I have drawn them, would cover up from an enemy between A and D troops advancing directly

[1] Mean Point of Impact.

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on him, hostile troops between B and C would be able to see advancing troops between E and F.

Hence the slantwise lane must be filled by another (dotted) screen Q. The amount of ammunition required may be calculated as for a following wind, but if each of the above lanes is formed by one 4·5″ howitzer shell, for instance, it will have a breadth of 25 yards, and will therefore obscure a rather larger extent (about 30 yards) at A and B. That is to say, somewhat less ammunition is required than with a following wind.

I.B. Yes, that's quite clear. Now how do you people work out the amount of ammunition required to produce a screen? It would be rather interesting for an infantryman to see what quantities of ammunition are actually involved, knowing as one does the comparatively small amount of smoke shell that you carry in the field.

G.C. Well, Sir, I have got some figures here which were brought out during the war, and have been confirmed with very slight alterations by some trials that were carried out quite recently.

Take an enfilade wind and call the effective length of the screen to be produced "X" yards.

For a following wind call the effective breadth of the screen produced by each individual round "Y" yards. Then the following table for a four-gun battery in a wind of 8 to 16 m.p.h. gives us the necessary information :—

Nature of Gun.	Rate of B.F.	Enfilade wind X = yds.	Following wind Y = yds.
4·5″ how.	15 secs.	1000	30
3·7″ how.	7 secs.	750	20
18-pr.	3 secs.	500	15
3″ Stokes	10 secs.	500	20
4″ Stokes	30 secs.	1000	35

Of course, the point is that the *rate of fire per gun* must remain constant, so that for a 6-gun battery the rate given in this table must be proportionately *increased* so that the rate per gun is not diminished.

I.B. That is rather abstruce. What I get out of it is this. With an enfilade wind you want 4 howitzer shell a minute for every 1,000 yards, and 20 18-pr. shell for every 500 yards or 40 18-pr. shell every 1,000 yards. Do you mean to tell me that the howitzer shell is ten times as effective as the 18-pr. for this smoke business?

G.C. Yes, roughly that is the case. You must not of course take those distances of 1,000 yards, 500 yards, &c., as being exact. They are approximate and we only take them as a guide. For instance, the smoke screen from 4 rounds a minute of howitzer shell might cover a length of considerably more than 1,000 yards, but not less. These figures, in fact, are a conservative estimate.

I.B. I tell you one thing which emerges from this table of yours, and that is, unless you could use a more or less enfilade wind, the putting up of a smoke screen, from the point of view of ammunition supply, is almost a hopeless proposition.

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G.C. That is so, and I am glad you have spotted it. It amounts in fact to this: supposing you are attacking down wind and want to use smoke, practically the only way in which you will get any value from smoke will be by screening the flank—if you can find one. In fact this very point might influence you as to where you would put in your main attack.

I.B. Yes. Its a point which must be considered. Now does a difference in the velocity of the wind make a great deal of difference to the amount of ammunition involved?

G.C. Oh yes, certainly. If the wind velocity or even the temperature either markedly increases or decreases, the ammunition expenditure will have to be increased proportionately if possible by increasing the rate of fire. So much so that in moving warfare it is seldom worth while to attempt to produce a screen in a wind of much more than 16 m.p.h. When there is no wind or in a very hot temperature it may be quite impossible.

I.B. Bless my soul! I had no idea it was such a tricky business. What are you doing about the improvement of the shell itself? Because it seems to me that if you can do anything to keep the smoke on the ground a bit more than at present you will be able to produce the same result with less ammunition.

G.C. Well, Sir, as a matter of fact, there's more in it than meets the eye. On many occasions it would undoubtedly be better for the smoke to be produced more slowly, but, on the other hand, there are possibly occasions on which a screen is required to form rapidly, and the shell must produce its full volume of smoke on impact. At present we are trying to hit on a solution.

I.B. Splendid. Well, when you have hit on it let me know and I'll bring some of my people to have a look at it. It may hearten them up a bit.

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AT GERMAN G.H.Q. DURING THE WAR.

Translated from an article in the *Revue Militaire Française*, September, 1923, by Commandant Grenier. "Au G.Q.G. Allemand pendant la guerre."

(Translated by Brig.-General W. Evans, C.M.G., D.S.O.)

LIFE at the various general headquarters in war is full of interest and rich in lessons of every kind. The story of the stormy existence led by the German High Command from 1914-1918 is still little known in France. A German staff officer, Colonel Bauer, who was at G.H.Q. throughout the war has painted in a book called "The Great War at the front, and in the interior" lifelike portraits of the successive chiefs, and of the leading personalities of their entourage. . . . . .

If the author is very bitter about the personages whom he worked with, one must recognise that he does not claim to be an impartial historian. A faithful follower of Ludendorff's, he enlarges on the theme set by his master: the German army was not beaten: it was from behind the lines that it was brought to disaster. . . . . Those responsible for the collapse of the army and the monarchy were the politicians whose apathy and want of energy placed all the burden of the struggle on the military leaders. . . . .

Before commencing it will be as well to say something of Colonel Bauer himself who, though sometimes intolerant, certainly possesses personality.

Bauer joined the Great General Staff at Berlin in 1905 where he had already known Schlieffen; in 1908 he was attached to the section for concentration and mobilization where he worked till 1912 under Ludendorff, already "a great man" he says. After a short stay in Alsace, Bauer came back in 1913 to the same branch. Ludendorff was no longer its head, having been succeeded by Lieut.-Colonel Tappen, who as we shall see later does not appear to have inspired Bauer with regard. In 1914, on mobilization, Bauer and his whole section passed to G.H.Q. where he remained till October, 1918. Though he belonged to the so-called operations section, Bauer's duties were very varied. Ludendorff in his War Recollections writes of him as follows:—

"Colonel Bauer was a remarkable man. Like me he understood that the principal condition for success was the country's readiness for war, and he worked ceaselessly to maintain and increase this. He brought great influence to bear on the development of the artillery. It was his business to keep the interior informed as to the requirements of the army in war material. From his relations with industrial

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employers and workers he had to decide what could be expected from industry. His co-operation and advice, on both economic and tactical questions were of the greatest value to the Command."

Bauer himself describes his functions as :—

"Condemned to sit in my office for fourteen or fifteen hours a day, my actions were all inspired by the desire to be worthy of the heroes at the front. My principal task was to find war material or troops to keep the army up to strength; I used every effort to stimulate the people behind the lines and to make them comprehend the magnitude of events."

Colonel Bauer's book gives the impression that he was very much interested in politics. True, he speaks of his technical rôle, but it is obvious that he was less interested in this part of his work than in politics. This is not a matter for surprise since Colonel Bauer with Captain Erhardt, Major Pabst and others took an active part in the Kapp "putsch." He was accused of high treason and had to appear before the High Court at Leipsic but . . . . obtained safe conduct to Bavaria where he conducted pro-monarchist propaganda. So Bauer is a politician of the Right and though his book is written about past events, its main purpose is to prepare for the future.

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To understand properly the weaknesses that Bauer discloses in G.H.Q. it is necessary to describe shortly how it was organised. According to the constitution, the Emperor, Commander-in-Chief of the sea and land forces was himself the supreme commander. The agencies whereby he worked were for the land forces the Chief of the General Staff of the Prussian Army; for the sea forces the C.G.S. of the German navy; it was besides an understood thing that where land and sea were both affected, the opinion of the C.G.S. of the army took precedence.

To simplify matters the Emperor had delegated to the Army C.G.S. the right to give operation orders in his name. Consequently the latter was the actual holder of the supreme military command; it being naturally understood that before important operations he should report to the Emperor and ask his decision. But the authority of the C.G.S., as delegate of the supreme commander, was limited by the constitutional powers of the other great authorities of the Empire. Thus the political direction by the Chancellor, and the army administration by the War Minister were independent of the C.G.S. The weakness of this organisation accentuated by the personal element caused great difficulties. Colonel Bauer took an active part in these and his book gives us a very good idea of what they were. We will now introduce as portrayed by Bauer the Emperor and his entourage, then the successive Chiefs of the General Staff with their principal collaborators, as well as various politicians who gravitated round, or in Bauer's opinion should have gravitated round G.H.Q.

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It was when G.H.Q. was at Pless that Bauer had the opportunity of meeting the Emperor. The chateau where the offices were located was surrounded by a big park where the Kaiser frequently took walks. The Kaiser often asked officers whom he happened to see to accompany him. It was thanks to this that Bauer was able to form an opinion of William II. Bauer describes the Emperor as being very religiously disposed and—obviously—as a lover of peace; but he adds:—

"His health was bad; frequent illnesses paralysed or diminished his power to make up his mind. He lacked the clear vision and determination of Frederick. He avoided urgent questions and unfortunately could not brook contradiction, especially in the presence of strangers. For this reason he surrounded himself with men lacking in capacity and personality. He paid dearly for having lost sight of Martial's axiom: "*Principis est virtus maxima nosce suos.*"

Who were the men who formed the Emperor's entourage? Bauer speaks well of General von Plessen, the Emperor's adjutant-general, who frequently gave him good counsel; but he criticises very severly the three cabinet ministers—civil, naval and military: von Valentini, von Müller, and von Lyncker.

These three men, says he, exercised a disastrous influence over the Emperor, especially the chief of the civil cabinet, von Valentini. Suspicious and reserved, the latter never showed the slightest sign of interest or satisfaction in anything that happened; he considered that no strong or upright man was fitted for high office; he never chose an eminent man for an important post; on the other hand he supported energetically those who were weak or dangerous. The admiral von Müller was not much better. He had succeeded slowly but surely in destroying the efficiency of naval officers by systematically placing incompetents in the higher appointments. The last of the trio was the minister von Lyncker. He was an honest man but lacking in judgment and initiative . . . . officers who had distinguished themselves were not pushed on . . . . and old or inefficient generals were not retired . . . . consequently the corps of officers had for some time become embittered, and was less efficient. There is no doubt that a great deal of the responsibility borne by the Emperor should be attributed to these three men. A more energetic ruler certainly would never have tolerated men of this stamp. Unfortunately there was no Stein with the Emperor to show him the calibre of his Cabinet in its true light; our Stein, Herr von Bethmann Hollweg on the other hand highly approved of Herr von Valentini."

Thus neither the Kaiser nor those immediately about him had the strength of character and ability which alone would have fitted them for the supreme direction of the war. We shall now make the acquaintance, through Colonel Bauer's eyes, of those really holding the military command; the chiefs of the General Staff, von Moltke, Falkenhayn, and Hindenburg with their principal colleagues. We shall see the consequences of the lack of co-operation between the high command and the civil power, and finally Bauer shall tell us of the

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intrigues that were hatched at G.H.Q. to work for the downfall of a C.G.S. or a Chancellor.

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Colonel Bauer dismisses von Moltke in a few lines; they confirm the pre-war opinion that existed in high military society at Berlin about the man who was to be C.G.S. of the German armies on the outbreak of war:

"General von Moltke," says Bauer, "was an intelligent and cultured man; seemingly reserved, he was actually very sensitive—perhaps too much so. He had accepted the post of C.G.S. from sentiments of absolute loyalty to the Emperor; unfortunately he did not possess the qualities of leadership; he was irresolute; besides he was very ill at the commencement of the war. His appointment to the most important post in the army was fatal."

Moltke had immediately under him as Q.M.G. General von Stein; Bauer describes him as follows:—

"Von Stein was a fine character, clever and hard-working, but he was very argumentative and often made things impossible for those under him. . . . . An exaggerated sense of justice made him weak . . . . perhaps this accounts for his failure later as War Minister, when he was confronted with the policy of the social-democrats in the interior."

Amongst the principal subordinates at G.H.Q. Bauer mentions:—

Tappen—head of the operations section.

Hentsch—head of the "foreign armies" section.

Nicolai—head of Section III b., which dealt with spying, counter-espionage, the press and propaganda.

Bauer criticises Tappen very severely:

The head of the operations section, says he, was gifted with unusual energy; he was courageous, and of quick decision. Hard working and exceedingly painstaking he would have been an excellent chief had his knowledge, intelligence and capacity been equal to his other qualities. Usually he was outwardly pleasant to those under him, but he became hateful if anything annoyed him, and this happened frequently. He hated anything new, and anything that in his opinion clashed with the sacred laws of tactics. He had the profoundest contempt for the technique of war; most of the staff had not clearly recognised the importance of this. Tappen was most disagreeable if any remark, however justifiable, was made that displeased him . . . . seldom has an officer been so hated by his subordinates.

One can gather from this the relations that existed between Bauer and the head of his section. He does not seem to have got on better with the transport specialist—Bauer evidently cannot forgive von Groener for his co-operation with the Republican Government.

"The Railway Service was under Lt.-Col. Groener, who was excellent at his work, and who got the best out of his subordinates. One must recognise, however, that he took over a working concern with an excellent staff, and the best personnel and material in the world. Those principally responsible for its efficiency were the civil

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authorities in peace time—chiefly the minister von Breitenbach. Groener was too slow to utilise the waterways, and showed want of forethought in not commencing soon enough the construction of locomotives and railway carriages. This led to great transport difficulties in spite of the efforts of his successor. Later, Groener failed signally as Chief of the War Office, and as First Q.M.G. He was, I am convinced, one of those mainly responsible for the most unfortunate revolution.."

After laying stress on the importance of the foreign army section, whose duty it was to summarise the information collected about the enemy's forces, information which should serve as a basis on which the High Command could make its decisions, Bauer appreciates the head of this section, whose name is best known with regard to the important mission entrusted to him during the battle of the Marne.

Lt.-Colonel Hentsch, according to Bauer, though he had many good qualities, had not the gift of distinguishing intuitively the false from the true—the news about the enemy was usually exaggerated and depressing and this made him pessimistic. He was thoroughly conversant with the work of his section and knew all about the French Army but nevertheless his was not a stimulating influence . . . . Lt.-Col. von Rauch succeeded him in 1916.

Major Nicolai, head of Section III b. does not come in for such severe criticism; probably because like Bauer he deplored the inaction of the Chancellor with regard to the press and propaganda. It was by reason of the abstention of the Government from these matters that Section III b., which normally was concerned with espionage and counter espionage, undertook these additional tasks. The control of G.H.Q. and Nicolai over the press was very limited, consisting principally in military censorship . . . . Bauer admits that Nicolai was a hard worker with a strong sense of duty . . . . but accuses him most unjustly of favouring the newspapers of the Left.

Now, having learnt the good qualities and the weaknesses of von Moltke and his colleagues, let us see the effect the battle of the Marne —long represented by our enemy as a German victory followed by a voluntary and well conducted withdrawal—had on them.

This is the picture painted by Bauer:

"Panic seized nearly the whole army, or to be accurate, many of its leaders. But it was the Supreme Command that offered the most lamentable spectacle. Moltke was absolutely dumbfounded. He sat before his map pale and listless, paralysed. General von Stein said that they must not lose their heads but did nothing . . . . he said "one cannot tell how things may turn out."

Tappen remained calm as usual . . . . but it never struck him that circumstances demanded that he should take action and get rid of certain officers. We younger officers were not consulted but agreed that the time had come to take strong action. We informed General S. as to the situation, going into great detail. He sided with us and went see the chief of the Military Cabinet; the result was that Falkenhayn assumed the supreme direction.

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Probably one will never know why the Emperor's choice fell on him. As a matter of form Moltke remained . . . . ;von Stein was given command of an Army Corps; unfortunately Tappen retained his appointment."

So Bauer prides himself on having assisted in the fall of General von Moltke—soon we shall see him claiming the same honour regarding Falkenhayn. The author of this article, Major Grenier, translates the whole of Bauer's description of Falkenhayn; the main points are:

Falkenhayn had great capacity for work; an excellent memory, quick comprehension and decision; his decisions were, however, frequently half measures. He would have made a better statesman than a general. After the autumn of 1914, guns and munitions and reinforcements were lacking. Though he took steps to remedy this, he did not act with sufficient energy and only partially succeeded. Regarding his staff he really only consulted Tappen and Sieger and left them too much liberty of action. Falkenhayn neglected to exploit completely gas warfare. Regarding his decisions—the launching of the Gorlice offensive was an important decision "but was he not led to make it on the suggestions continually made for several months by several of his staff officers . . . . in any case it was a mistake not to make this offensive in conjunction with a big enveloping movement by the armies in the east which might have led to the destruction of the Russian Army." . . . . The resolution to seek for a decision on the western front in the spring of 1916 would have been wise owing to the German superiority in men and guns at that time if it had been on a wider front; when the enemy had checked the attack, it was continued without proper co-ordination and caused considerable losses; the attack should have been stopped by the middle of March. . . . . The continuation of this battle into the summer turned Falkenhayn's attention from the Somme where the enemy offensive surprised the Germans and cost heavy losses. It also put them into a very unfavourable situation when Brusiloff commenced his offensive for their aid to Austria was half-hearted and too late and this led to Rumania declaring war.

Bauer then talks a good deal of Falkenhayn's political failings—that he made no attempt to co-ordinate the political direction of the war with strategy—that the High Command did not co-operate with the Government.

To sum up, faults were committed during Falkenhayn's command for some of which he was entirely responsible; the enormous losses at Verdun and on the Somme had badly affected the moral of the troops; in the East Brusiloff's offensive had been launched; Rumania was on the verge of coming in. Colonel Bauer again steps in and describes how the younger officers asked him to intervene. He first went to Wild von Hohenborn the war minister without result, then to von Plessen who, when it was explained to him that the gravity of the situation had led them to have recourse to such an unmilitary procedure, heard what he had to say, but nothing actually happened until after Rumania had declared war.

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"The next day I again went to see General von Plessen and pointed out to him that Ludendorff was the only man who could save the situation; I besought him to come to our assistance. I learnt shortly after that tne Emperor had given his consent. On August 29th, when I got up—as usual I had hardly slept at all—it was a dark morning, and our hearts were darker still. Suddenly the sky cleared; Hindenburg and Ludendorff arrived at Pless in bright sunshine . . ."

* * * * *

We have seen the part Bauer says he took in getting rid of Moltke and Falkenhayn. On August 29th 1916, he should have been satisfied, as from that date the German armies were commanded by a C.G.S. assisted by a Quarter Master General chosen by him. However the author has very different opinions about the two men, his portrait of Hindenburg is almost a caricature, while he presents Ludendorff in a most favourable light. (It seems hardly necessary to give Bauer's impressions of Hindenburg.)

"Ludendorff was a soldier to the finger tips but his devotion to the Emperor was dominated by a great and profound love for the German people. . . . .

Strategic plans must naturally be dependent on the economic and political situation; however Ludendorff's economic and political conceptions were not always accepted by the Government and he frequently had to fight them. Naturally he had not been brought up to economic matters. How should he have acquired expert knowledge of coal, iron, etc. . . . ; however he had reports sent to him and very quickly seized on the main points with great clearness of vision, and was soon able to understand and control the experts—the more important economic questions became the more study he devoted to them. He interested himself less in politics and the press; his honest nature abhorred party quarrels; though he saw that all the political questions were war questions, he only too willingly left them to the Chancellor responsible. In spite of all his disillusions, he relied too long on the possibility of agreement with the latter and of obtaining his support. . . . ."

As soon as he had taken up his appointment, Ludendorff reorganised the Operations Section; Tappen disappeared; Major Wetzell became head of the section.

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The relations between G.H.Q. and the Chancellor responsible for the political direction of the war have already given Colonel Bauer many opportunities for severe criticism of the Chancellor. Under the Hindenburg-Ludendorff regime the tension became acute and resulted in the downfall of the Chancellor. Colonel Bauer tells us the various events that led to it and does not conceal the fact that he took an active part in bringing about his fall—in fact he glories in it. If it was not for the fact that Bethmann-Hollweg corroborates this in his memoirs one would be apt to think that Bauer exaggerated the importance of his rôle.

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"In the Spring of 1917 the political situation became worse and worse; it was impossible that the army should not be affected by it. For military reasons the Supreme Command could not remain an impassive spectator. Besides its relations with the civil power became more and more strained. Of the Kaiser's advisers those most opposed to strong measures were to my mind Bethmann-Hollweg and von Valentini. I fought them both with all my strength. Bethmann's weakness and complete political incapacity had long convinced the Marshal and Ludendorff that he ought to go; but the Marshal hated to take this 'political' step and it was only after much hesitation that he decided to associate himself with it. The Emperor however appeared to wish to uphold Bethmann; so much so that on June 12th 1917 Hindenburg and Ludendorff decided to offer their resignation. I was most uneasy as I feared that Ludendorff only might go . . . .; if that had happened we should have been lost from that moment. Luckily Bethmann was violently attacked in the Reichstag, where also he was unpopular . . . . I was then at Berlin . . . . I could only see one way out of it, to work personally for the downfall of Bethmann. I telephoned to the Crown Prince that it was absolutely necessary that he should come . . . . I explained the situation to him and convinced him of its gravity. The Prince tried to get the Kaiser to dismiss Bethmann; he failed, but on my advice had a meeting of the party leaders of whom the majority voted against the retention of the Chancellor. Furnished with a report of the meeting the Crown Prince finally obtained the dismissal of Bethmann. . . "

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So G. H. Q. triumphed; Bethmann had fallen, but who should succeed him? The Supreme Direction wanted to appoint Prince von Bulow, but von Valentini in deference to the Emperor's wishes decided otherwise; Michaëlis was appointed; he was shortly afterwards replaced by Hertling. "Old and worn out, incapable of work, equally incapable of understanding the epoch in which he lived. He had in Bavaria attacked the Supreme Direction most unjustifiably; perhaps that is why Valentini chose him. Ludendorff however at once offered him his loyal co-operation."

Thus the new Chancellor was no more to Bauer's liking so he moved heaven and earth, Ludendorff and the Crown Prince to compass his downfall. Beyond this Bauer tried to plot with the Crown Prince to get the Emperor himself to temporarily resign.

"I strove to launch a new attack against Hertling; this was in vain; Ludendorff declared that they had promised to work together and that he would loyally carry out his promise. This was not so faithfully kept by the Chancellor. The demand to at least change the War Minister and the head of the Kriegsamt (Gen. Scheuch) was refused. The only man who saw and wished to see was the Crown Prince.

I said to him at the commencement of February 1918 that the Emperor was no use to us, because he took no measures himself, and appointed the wrong sort of people to the important posts; I declared

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to him that we were heading for revolution, and that in my opinion the Emperor ought to intervene, or else give up the reins of government for the time being. But the Crown Prince declined to take sides against his father in any way. Ludendorff, too, considered it was impossible to embark on such a step . . . . So fate took its course; our only hope was the imminent offensive."

But the offensive did not produce the results expected. The spring, summer and autumn of 1918 only brought new and cruel disillusionment to the high command. Bauer, after having worked so hard to clear the way for Ludendorff now had to witness the fall of his idol.

From September 29th after the Spa conference in consequence of which Hertling retired in favour of Prince Max of Baden, Bauer saw the game was lost and declared to Ludendorff that "no longer do the people want to make war but are clamouring for your head and the Kaiser's." The 24th and 25th October were the last days of the Quarter Master General.

"On October 24th, about 12 noon, Hindenburg and Ludendorff arrived at Berlin from Spa. I myself had been there since the 22nd. I went to meet them at the station and as far as I was able I warned the General that 'they wanted his head.' He made me a sign full of gravity and went with Hindenburg to see the Emperor. He returned shortly after; the Kaiser had been most amiable . . . . That evening there was a conference with members of the war cabinet. Next morning he saw the Emperor who received him coldly. The First Quarter Master General made a brief report on the situation; it was then that Ludendorff received his dismissal, an event of world wide importance. The time has not yet arrived to give the details; but they should not be lost to history, as they give briefly a clear idea of the opinions and the mentality of the Kaiser, Hindenburg and Ludendorff.

An hour later Ludendorff sent for his friends. Calm and dignified he told us quite shortly that he had received his dismissal. This was no surprise to me, but none the less I was greatly upset. It was the end.

I went away and reported sick. I could do so with a clear conscience. After the general left the war and the monarchy were lost."

From now on, Bauer, who seems to have considered himself as being in the personal and exclusive service of Ludendorff, ceases to be an ocular witness of events; his story is only collated from various sources; and in such a controversial spirit that it loses all interest.

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In reading these scenes and portraits which Colonel Bauer has sketched with so much passion, the thought comes naturally into one's head: What Frenchman however optimistic would have suspected how ill-defined were the duties of the various organisations of the German Empire, that they were subject to such difficulties, and that such grave conflicts were taking place between those in authority.

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What had become of that spirit of discipline that the German army claimed as a monopoly?

How in fact should one judge the staff officer, who while serving at G.H.Q. intrigued to have General von Moltke dismissed, took an active part in Falkenhayn's removal, who when at last satisfied at having the chief he wanted, Ludendorff, turned his destructive energy against the civil authorities of his country. He glories in having caused the downfall of a Chancellor, Bethmann-Hollweg, attempted an attack on one of his successors, and even dared to propose to the Crown Prince that he should ask his father to resign power for the time being. Colonel Bauer must certainly have known when he produced his book that he would be blamed for having exposed all the German failings. But what cared he. His book is the book of a politician; he is carrying out the policy of his party which is to prove that the responsibility for the *débâcle* rests not with the High Command but with the civil authorities of the Reich. His aim is to lead the German people to have confidence once more in the party that led them to war and to defeat, to group them once more under the Prussian flag, and prepare them for the war of revenge.

Bauer has moreover himself indicated this line of thought in the preface to a propagandist publication circulated through Germany called: "1934: Resurrection of Germany."

This pamphlet is a story in which the author, who commanded a 420 battery during the war, imagines that the German army obtains its revenge by means of new technical methods. In his preface Bauer states why he approves of it in the following words:

"It is well that every invention ought nowadays to be examined from the point of view of how it can help us out of our distress; it should also be made known that anyone who can make such researches, or has the means of helping those engaged in them should do so as a duty. Whoever on the other hand sells inventions likely to be of use to foreigners is a scoundrel of the same type as those who betray stores of arms to the Entente.

Faint hearted people perhaps will say: 'Yes, but do not talk of revenge to us, because we are helpless.' That is a wrong idea. True at the present moment we are disunited and are destroying one another and are incapable of taking our revenge; but it is necessary to keep the people up to the mark, and to prevent them from becoming disheartened or apathetic. After 1806, when Napoleon strangled Germany—though not nearly to such a degree as the conquerors of 1918—and when no one yet thought of the possibility of reprisals, a German poet sang:

'Kill them, the Supreme Tribunal will never ask you why.' "

One could not put it more clearly. Bauer's strong party feeling, his unruly nature and passion for war proclaim him a true member of that Conservative party which by intimidation will no doubt continue for some time to influence the trend of German policy. In this connection, of all the portraits Colonel Bauer presents us with, perhaps his own painted by himself is one of the most interesting.

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THE FAR EAST ON SHORT LEAVE FROM INDIA.

BY MAJOR G. M. ROUTH, C.B.E., D.S.O., R.A.

THE best way to spend privilege leave is a matter of opinion. Shikar, hill stations and Kashmir each have their devotees. England usually proves impracticable owing to the high cost of passages and the time spent on a not very interesting sea trip.

For a man travelling alone the Far East offers many attractions, sea passages are cheaper, and the standard of comfort is more luxurious than is customary in India. The writer's total out of pocket expenses including purchases during an absence of 70 days from Calcutta worked out at two pounds a day, less than Baltistan and about the same as a hill station hotel.

The original intention was to journey straight to Java by a Dutch coasting steamer (K.L.M.), to some of the ports in Borneo, Bali, Lombok, Celebes, Timor, the Spice Islands, Sumatra, or possibly to New Guinea, the route depending on sailing dates. This is a convenient and comfortable method of studying tropical life in these regions but fate ruled otherwise. Anyone selecting the Dutch Archipelago for a holiday would be wiser to go with a companion. The Dutch skippers all know English and are mostly delightful old salts, but their outlook requires a background and change. By the route eventually followed, one meets so many kindred spirits that a single traveller can get full value. It is of course cheaper to share motor cars, etc., but one can generally make a party.

After leaving Calcutta and changing steamers at Rangoon, Penang was reached in eight days. A variation of this is to go by B.I. steamer down the Tenasserim coast. The Siamese Government propose to join up their rail system to Tavoi when the Burma line now under construction to that place is completed. The French in their turn intend to construct an extension from Saigon and Naum Pen by the colossal ruins of Angkhor to a similar extension from Bangkok. It will then be possible to rail from Rangoon to Bangkok or Saigon and shorten the voyage East by cutting out the Malay Peninsula detour.

The writer disembarked at Penang and travelled with a friend met on board, consulting adviser to the R.G.A., to Kuala Lumpar, staying one night at Ipoh. He discovered that R.G.A. denoted in these parts "Rubber Growers Association" exclusively.

Money is plentiful in the F.M.S., and hospitality a matter of course. Everyone seems anxious to ensure that visitors enjoy themselves. Quite a good month could be spent in the F.M.S. For a

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long trip, however, where steamer movements could not easily be ascertained, it was wiser to push on and Singapore was reached ten days after Calcutta. Mail trains run weekly from Bangkok through Prai (36 hours) the mainland station for Penang and Kuala Lumpur (known as K.L.), to Singapore. The last service from Penang is a daily one passing in the 24 hours through some very interesting and characteristic scenery. The station hotel at even a smaller place like Ipoh is as comfortable as the Taj and not much smaller, and the club at "K.L." commonly known as the "Spotted Dog" boasts some 5,000 British members mostly out to enjoy life.

A travelling companion on the Singapore train—a legal light in K.L. but with pacifist and socialist leanings—had had a breakdown and was going for a round trip of three weeks on a Straits Steam Ship boat to Borneo and the Philippines. This sounded attractive, but as the s.s. *Selangore* sailed at noon and the train arrived at ten, no time was to be lost.

The *Selangore* (700 tons) is one of three steamers sailing on the 1st, 10th and 20th of each month to Zamboanga, Philippine Islands via Miri (Sarawak pronounced Sarāwa), Labuan, Jesselton, Kudat, Sandakan, Jolo, returning the same way. The round trip takes three weeks and cabins and saloons are comfortable and not expensive. Rough weather is seldom encountered on these inland seas and the service is much used for pleasure trips by Europeans in Borneo and the F.M.S. On this particular trip there was an average of ten men and five ladies, about half of whom were American. The *Selangore* took three days to Miri and from then stayed the day in the various ports and sailed at sundown making an extremely pleasant cruise. Borneo is not hot, in fact during the whole trip away from Calcutta, not only were no punkhas available at night, but none were necessary. The days were often steamy but less so than in the summer in Calcutta.

Miri is an oil field (Asiatic Petroleum Coy.) with refinery and all the lavish expenditure and luxury that this involves. (There are at least 50 white ladies there with clubs and villas which are laid out with all the conveniencies of American dwellings). Labuan, an important naval station in 1842, is now only a small island exporting tropical products such as kopra, rattan and sharks' fins (a Chinese delicacy). Jesselton is a township with modern comforts built by the North Borneo Company. Borneo in one's early days always sounded a romantic hunting ground, and the writer's imagination was fired by Wallace's "Island Life" and "Malay Archipelago". The northern portion only is British—divided into Sarawak and British North Borneo. Sarawak is still ruled by the Brookes and still peopled by Dyaks, but they don't head hunt now, at least not officially. Dutch Borneo is more vast and remote and possibly an enthusiast might find himself in a collection if sufficiently patient. But even then the rivers offer too good a method of communication to encourage decapitation. For those who still desire adventure, New Guinea offers a noble field. The rule of the Dutch residents not being backed by the force needed for such wild fields, life remains primitive—even primeval, especially in the remoter tracts by the snow clad mountains.

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The Papuan is a Kanaka, as distinct from the Malay, and from tales extant, his social customs, intended to be eugenic, are more likely to lead to the race becoming extinct. There is a savour of Bolshevism in the practice by which brides are subject to the attentions of all the tribal braves who on such occasions enjoy le droit de Seigneur.

The Malay Archipelago is a region of great possibilities. Some say the Dutch govern it well. It is possible that a nation with greater resources and connections would effect its development more rapidly. In all these lands of course the easy going Malay temperament delays progress. When hard work is wanted, the Chinaman is the only resource. He is the mainstay of the Archipelago. The Tamil may excel in a job like tapping rubber and the Malay may be a more successful fisherman, but the Chinaman is the man with the money and the man that matters. In Jesselton American influence is seen in the mission of the Seventh day Adventists.

In spite of a 65 mile railway, the neighbourhood of Jesselton is not sufficiently developed in proportion to the town at present. Cocoanuts are improving but rubber is so far not too encouraging. Kudat is a smaller town exporting timber and tropical products. From it can be seen the peak of Kina Balo (14,700 feet) which will make a good hill station when North Borneo with its 1,600 whites becomes populous enough to require one. Sandakan is really the capital, at the head of a magnificent harbour. Many cite it as preferable to Singapore for our Eastern Naval base and it certainly has many advantages such as a good harbour, comparative proximity to Australia, the resources of a large island like Borneo, etc.

At this point the writer endeavoured to cut across 150 miles overland to Tarakkan, the oil fields in Dutch territory, but this proved impracticable owing to the large number of coolies necessary to force a path through the thick tropical forests. There is no danger except perhaps from orang outangs. The old days when the Dyaks bought the aged Filipinos from the Moro pirates to sacrifice to their implacable deities have gone by.

All these seas are full of the typical coral reef islands of Robinson Crusoe, which one sees in every process of formation. These and the rich tropical forests, calm seas and purple sunsets form a series of pictures never to be forgotten. Each evening of that week as the ship left port was an orgy of beauty enjoyed in a long chair with a whisky and soda and pleasant companions.

Jolo, an island in the Sulu Archipelago is the first Philippine port and was once a stronghold of the Moro pirates. The Spaniards built the fort, about the size of Bannu fort, in the seventeenth century but even so were periodically massacred. The Americans conquered it in 1902, but even now everyone has to carry revolvers when motoring across the island, which is, however, in other ways much more developed than Borneo. It is a centre for shells for the button trade and oysters can be got twelve inches in diameter, albeit too coarse for Europeans to eat. Zamboanga is a modern American town with electric trams and tropical comforts, cabarets and shops. The passengers of the *Selangore* put up in the Plaza Hotel—six pesos a day (peso=2s. 4d.) and were honorary members of the Overseas Club.

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Here is the Government of Mindanao, an island about the size of England, which had been for a thousand years the home of the Moros and was only conquered by the Americans 1902-12. Now it is fairly safe for Europeans, though not for Filipinos from the other islands. The climate is moist—even in the club—for prohibition does not apply here. The Moro Battalion, now reduced to three companies, is commanded by Major Fletcher who for 23 years has been a personal power in these parts. He is one of the original "Scout" officers who do not come under the rule for a two years tour and it is by his influence that the chiefs of native tribes now keep order as officers and N.C.O's in his unit. The men are smart and bloodthirsty and should be a useful force under their white officers. Their equipment is as perfect as money can make it. Certainly there are echoes of retrenchment even here, but its application to equipment is shadowy, and one finds many luxuries, such as an automatic rifle for every fifth man and four Browning machine guns with panoramic sights per company. Company and platoon arrangements exist, while in Manila, S.A. repair lorries, for the repair of small arms in the field, are maintained to accompany each brigade. The sectional tent d'abris can also be used like our sheets W.P. Mk. VII. in India. The infantry soldier carries 67 pounds, which indicates good physique. But then the army in the Philippine Islands is not, as in India, financed out of local revenues.

The Philippines are in the initial stages of self government much as India is. Everywhere Americans have been replaced by natives with much the same results. The Inter Island boats are now transferred to Filipino owners and have become neither regular nor sanitary. After a wait of six days, the writer preferred to embark for the 612 miles to Manila in an 87 ton barque—square rigged, with 200 h.p. auxiliary engines capable of four knots in a calm. She was 40 years old, built of wood and not free from vermin and on this occasion carried a cargo of hard wood from Cotabata up to the Plimsoll mark. Three of us slept on deck as the only cabin was the captain's. The captain was a Swede who was in the American navy before Manila in '98. Three of us took effective steps to keep him sober till the ship sailed and as his one bottle only lasted the first day, the rest of the five days was free at any rate from that anxiety. But the south-west monsoon was blowing and we had to keep in the lee of the islands, because the rotten old timber otherwise made water too fast for the pumps. Once, after two hours blow unprotected, we were very glad to lie to under shelter and pump out before worse befell. The other two passengers left at Negros and then the Filipino chief, mate and second joined us at meals—such meals. Fish eye soup was one delicacy.

The group consists of over 3000 islands, some of great beauty and interest. Manila Bay—a 25 mile circle with a narrow entrance 10 miles wide, is in the island of Luzon. The islands in this bottle neck are very strongly fortified with modern armaments. Corregidor is a self contained cantonment very popular among American officers.

Letters of introduction from Zambo made quarters possible in

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the Army and Navy Club, a very much cheaper and pleasanter mode of living than the Manila hotel. The American army in the Phillipine Islands much appreciate the visits of British officers and go out of their way to see they have a good time. They have no secrets from our army and are only too delighted to show us round their various military activities.

It is suggested that anyone travelling to Manila in the future, should carry a letter of introduction to the British Consul General, who can arrange formal calls on officers, meetings at the club, etc. American officers are cheery and friendly and appear more ready to welcome strangers than we are on this side of the Atlantic.

The American army in the Phillipine Islands with an area roughly two-thirds the size of France, consists of about 6,000 Americans and 11,000 Filipinos officered by Americans. The latter are organised on the group system lately adopted in the Indian army. As a result of the intensive educational programme all over the Archipelago, every soldier can speak English. A Division was warned for France in 1918, but peace came before it was ready. It is doubtful whether men accustomed to the tropics could have stood a winter in France, but on the other hand, many officers believed that they would have stood shell fire with very much the same fatalism as the Japanese. Beyond heavy fighting against the Mohammedan Moros in the island of Mindanao and Sulu in the first decade of this century, this army has seen no active service. Japan is the nearest potential enemy and against any Japanese aggression, Filipinos are prepared to make any sacrifice. The northern (and largest) island of Luzon which contains Manila, is only 60 miles from the islands south of Formosa which are in Japanese hands, and the problem is therefore one which must be considered. The opportunity was taken to study the American system of ordnance supply under conditions approximating to those in India.

Like the Germans and French, the Americans divide the functions of their Ordnance and S. and T. differently to ourselves. They maintain that no one officer can become expert in so many activities as the R.A.O.C. attempt to administer, and that the dividing line should be between the more commercial problems of universal supply and the purely technical side of guns and ammunition. The former they recognise as the Quarter-Master's Department (Service de l'Intendance), and the latter as the Ordnance Department (Service de l'Artillerie).

The Q.M. department comprises transport and supply of all stores, clothing, food, saddlery, furniture, tools, oils, etc., etc. It also embraces construction, maintenance, and repair of all War Department buildings other than permanent fortifications, fire measures, laundries, war organisations of supply and transport, and other services undertaken by R.A.S.C. and Ordnance in England. The transportation division includes marine, motor and animal transport and the up-keep, which entails dockyards, garages, and breeding operations.

The ordnance department manufacture and maintain guns, rifles, ammunition, tanks, fortifications, and engines of war, such

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as armoured cars and trench munitions. They construct and maintain their own buildings and workshops and the majority of their officers have obtained, either at West Point, or in American universities, degrees as civil or mechanical engineers. Both these departments obviously base much of their present system on the British system of 1917-18, with the details Americanised. Thus when our officers have often to fight for a barrack table, the merest private clerk has a roll top desk, and steel filing cabinet and electric punkah. The central offices are arranged in a very large room with some twenty officers ranged down one side. Their subordinates work the other side of a low rail, in sight, but not in close ear shot. The system has points to commend it. Their "utilities division" is a sort of general repair shop for the whole army—clocks, typewriters, printing, furniture, clothing, cooking gear, salvage, etc.,—which deals with all government property which cannot be more cheaply repaired locally. They employ a poly-glot crowd of workmen, nearly always with white or Chinese foremen.

Both departments attract the best men in the American Army and have higher comparative status than our own departments. The ordnance officer especially is highly rated, while an efficient Q.M. is looked on in the army much as the successful business man is regarded by the American civil community. The ordnance officer, having activities not paralleled in civil life is not liable to outside criticism, but the Q.M. department is, and not uncommonly comparisons are made between military methods and their corresponding civil ones.

Speaking generally the pay of the Ordnance and Q.M. Corps, the only pay studied, corresponds with that of I.A.O.C. and I.A.S.C., but the Americans have realised that it is by compensation in kind that a good type of officer can be attracted, rather than by increasing emoluments and thereby, indirectly, the officers expenses.

Government gives him, in the Philippine Islands, rations, quarters with very moderate rents, and a naval and military residential club built at public expense, a laundry on modern lines in which a dress shirt or white suit costs three pence to wash, and canteen where all supplies and delicacies, tinned and fresh, can be purchased retail duty free, at the wholesale price in U.S.A., which means less than half local prices in Manila. An officer is also allowed two polo ponies purchased and maintained by the state. He is granted a daily allowance on long leave which covers his passage money to America apart from his pay. To encourage travel and widen their out-look, the period of the daily allowance is doubled if the officer wishes to visit India or return via Suez. Officers may also import cars and other articles free of duty. Incidentally, petrol is only 6d. a gallon.

This list does not by any means complete the amenities thus provided free for which we in India have to pay out hard cash. In the aggregate, the result is that few officers have financial cares and 90% are married.

No doubt the American army has not the traditional status of the older military states of Europe, and the state has to give more to tempt youngsters away from the plums of the business world, but

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one cannot help comparing their easy life with our own struggle for existence.

Manila is a city of 300,000 inhabitants, with all modern comforts. Everywhere are signs of Uncle Sam's money being spent like water. The old fort—now called the Intra Muros—is about the same size as Fort William, but held in Spanish days most of the European population. The Americans drained the moat, a stagnant mass swarming with crocodiles and gigantic snakes and reclaimed a large area all round known as the Luneta, on which were built the magnificent Manila Hotel, the Army and Navy Club, the Elk's Club, etc. Seawards new deep water docks were formed and the whole of the Quarter-Master's Department and customs, covering in all about two square miles of ground. There is a large British colony in Manila, most of the shipping being in British hands. The British have their own club which some of the quieter Americans prefer to their own. Fort McKinlay about seven miles out, connected by electric tram, is the military settlement, well laid out on high ground over-looking Lake De Bay. This is the headquarters of one divisional commander.

There are excellent shops in Manila—albeit expensive—and everyone lives in a round of gaiety. The polo club, with its quarters, dancing floor, and fresh water and sea bathing is a seductive resort about five miles out. Dancing is a passion, during and after dinner, at the clubs and Manila hotel. The trouble people find is that dancing at the hotel stops at 1 a.m., after which noisy parties go on to Santa Ana or Cavite Cabarets, three and twenty-eight miles out. Santa Ana is three hundred yards by a hundred, with good music and a good floor. There is a screen in the centre, one side being reserved for parties and the other for all comers, who pay for their little Filipina partners, or "ballerinas" as they call them. After 5 a.m., when Santa Ana closes, it is still possible to dance in Manila till 7.30, but even Americans don't do this often. About 80 miles out of Manila by road and rail is Baguio, the hill station, about 5,000 feet up, which can be reached in comfort in about seven hours. Here are hotels, hostels and villas, much patronised by all white people. In appearance it is not unlike Darjeeling, but probably government put down far more money in its development than for Calcutta's hill station.

The town is of great interest, whatever the traveller's tastes. Business activity, native life, scenery, and churches of the early Spanish occupation all afford incentive for exploring. Money out west seems to be more easily come by than in Europe. Certainly the Americans in this dependency appear to live a careless life with no thought for the morrow. If a man sees prospects of promotion in A's office are slow, he goes to B and says he is worth more and will B give it to him. B appreciates his ambition and generally does. But if A and B in Manila are British, B asks how long he was with A. and why he left. He prefers in fact steadiness to meteoric ambition. The result is obvious. Britishers by long acquaintance are masters of their respective jobs and their Yankee cousins have more often just arrived or are just leaving. Their wives must be a worry sometimes. They are mostly smart and good looking and a

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large proportion of officers' wives have money. But their search after amusement is more hectic and inveterate than we are accustomed to see. Their husbands too seem more tolerant and are satisfied more by the social successes of their spouses than by their personal companionship.

It must not be imagined that the colonising ability of the American is being called in question. In this their only colony, they have so to speak made no trumps. An outsider might appraise their efforts at 60% and results 30%, where we in India have expended 20% and obtained the same 20%. It was their first experiment, their national new born baby, their outlet for lawful adventure in the first decade of the century. Worcester's "Philippines past and present," is a record of Anglo Saxon endeavour against odds. Education, sanitation, local resources and political science are here seen in the making, and a very creditable experiment they make. In the Philippine Islands they took over a race in open insurrection to Spanish rule and they crushed it with a hand, strong but kind, having behind it the whole power of the American state. "The Social Cancer," by Dr. Rizal the Philippine martyr, shot in the back by the Spaniards in 1896, shows the state into which the islands had degenerated and it is doubtful if the Spaniards could have ever restored peace. The old tyrannic feudalism of the middle ages had been exposed in the light of modern propaganda and had to be replaced by a new structure beyond Spanish power.

The inhabitants of the Philippines are of Malay extraction, having conquered the islands in the distant past. Now, they are nice merry musical children, but with no more energy or sense of governing and responsibility than pet rabbits, neither could they defend themselves for 24 hours if the democrats in the next American government decide to hand them back their islands. This last decision would spell an Eastern crisis of the first magnitude. Many interests would be involved and many vital problems would require an immediate solution. The many nations on the China Seas have not yet worked out and published any modus vivendi and until they do, the spark may fire the tinder at any moment. The Governor of the Philippines, Major-General Leonard Wood, is a personality in himself repaying a visit so far East. He was the American representative at the German manœuvres in 1902 and 1907 (as Governor of Cuba). His life has been a selfless record of patriotism which has left its mark in such measures as the universal training movement now started in America. It is in his powers of conversation that Wood's mind impresses itself on all who meet him. Although 64, he has the sanguine outlook of 32, unspoiled by success. He views the Pacific as the arena of the next great contest for Empire and that in the very near future: he looks on every British officer as a friend in need and exhorts them to keep efficient against the day when Anglo Saxons will stand back to back against all comers.

The writer finally left Manila for Hong Kong by the s.s. *President Lincoln*—8,000 tons—on September 12. It was not possible to return via Celebes and Java to Singapore as vessels by this route

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are scarce, while to Hong Kong they leave almost daily. These President boats are expensive—seven pounds for the 36 hours passage but extraordinarily comfortable. Much has been written about Hong Kong, but little can have been exaggerated. The view of the harbour, the lights at night and the 30 mile drive round Victoria Island, must remain in one's memory. In Hong Kong are crowded 6,000 Europeans to carry on the work of the biggest commercial emporium of the East. Here again life is gayer and more pleasing than in Bombay and the five days spent there bring back very pleasant memories, not the least being the cheery mixed bathing parties in some quiet bay on Victoria Island from a launch.

To Canton was a comfortable trip—two nights on the steamer and a day in Canton. Dr. Sun was on the war path and many were shot in the town that day. But the Chinese merely closed each street while fighting was actually going on and foreigners were not molested. The three of us gambled at Fantan, bought ivory, silks, and "Mahjong," and attended a funeral and did in fact all that decently comported travellers were supposed to do, including a very excellent lunch in the Victoria Hotel, Shameen, the European quarter.

Hong Kong had not yet recovered entirely from the cyclone of August 7, in which 130 miles an hour, the highest wind pressure ever recorded, was registered. The harbour still showed four wrecks and one submarine aground and some of the windows and frames of solid built English villas had been blown in. The journey was continued in the M.M. Mail Boat *Andre Lebon*, 20,000 tons, which had blown adrift in this storm and after being patched up continued to Yokohama for refit. Certain important portions of the ship were buried in the fissures which opened in the ground during the earthquake, so she again patched up and spent six days refitting in Saigon, the largest port of French China.

Saigon is just a piece of Paris planted out East, with the Boulevards a little wider. The Bourse, Hotel De Ville, the Opera and Notre Dame all look at one with the same size and same setting as in Paris. The large colony of French live exactly as in Paris except that the resources are more limited. It is a beautiful and interesting city. The country round as seen from a motor car, with its roads and bridges, irrigation and other public works gives one furiously to think. The French laugh at our unrest in India, and the Americans' troubles in the Philippine Islands. Certainly the Annamese are contented and never talk of self government. True aeroplanes do sometimes persuade backward tax payers, but it is not often necessary.

French China is about the size of Burma, but more French capital has been spent in its development. Now, it pays its way, except that the army is maintained by France. Local resources are being rapidly expanded and the French hope some day to make the country self supporting.

French or even American colonies are not run on the open door principle as ours are. Duty on French cars or goods is nil. Foreign cars pay 45% and goods in proportion. Whisky is forbidden alto-

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gether, otherwise, French brandy would have no sale. Visitors are encouraged but not foreign capital.

To visit the ruins of Angkhor built by the early Cambodians in the first century of the Christian era, requires 14 days from Saigon at present, and the season only opens from October to March. They are by far the largest single block of ruins in the world and the buildings are on a vast scale. Neglect and tropical vegetation are working into the crevices and gradually disintegrating them and it is a question how much our grandsons will find. Another five years may see a railway from Saigon to Bangkok (and thence to Tavoi, Singapore and Rangoon) passing within 20 miles of these remains, when it is proposed to organise sight seeing on a large scale.

We reached Singapore eight days late. It was not safe to discuss Yokohama with the French officers on board. They had had enough. Petrol had been burning on the water all round the ship, most of the wires were fused, and furniture and linen were short, much having been distributed to refugees. The French Consul's wife travelled minus a husband, after terrible experiences and another wealthy woman had lived like a pariah dog hunting scraps for three days in Tokyo until rescued.

We only waited six hours at Singapore, but had two days in Penang changing ships. Penang Island shares with many others the claim of being the most beautiful spot on earth. If profusion of tropical verdure and blue hills and sea count for anything, perhaps there is something in its claim. The motor trip of some sixty miles round opens up ever changing vistas of mountain and woodland views, which for variety and restful charm have a distinctive character probably unsurpassed by any similar scenery in the world.

Another gunner and his family were travelling on the B.I. s.s. *Loosang* to Calcutta. It was not so comfortable or so pretentious as these huge mail boats, but withal there pervaded a not unpleasant feeling of homeliness. Calcutta was reached on the 9th of October. The muddy old Hooghly denoted the end of a 70 days' tour amid friends and surroundings possibly as varied and interesting as this hemisphere can produce.

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METHOD OF CALCULATING THE ANGLE OF SIGHT BY MEANS OF THE SLIDE RULE.

By MAJOR J. A. DANE, D.S.O., R.A. (T.A.).

IN his very interesting article in the April number of the Journal Bt. Lieut.-Colonel E. C. Anstey, D.S.O., scarcely does justice to the 10″ rule. The method he gives for the calculation of the angle of sight between two points of which the heights are known involves two calculations and is admitted to take 30 seconds.

It is claimed that the method suggested below is simpler, takes only 10 seconds and gives equally accurate results for all practical purposes.

It is based on the formula

$$m = \frac{1146\ h}{R}$$

where m = Angle of sight in minutes,
h = Difference in height in feet,
and R = Range in yards.

For practical purposes 1140 may be taken instead of 1146, as it is marked on the rule.

Taking the same example as that given in the article referred to, viz., a difference in height of 150 feet and a range of 4600 yards, we place the right hand 1 on the upper scale of the slide under 150 on the upper scale of the rule. We then place the cursor over 1140 on the upper scale of the slide, and (taking care that it remains where placed) move the slide to the left until 4600 comes under the cursor. Over the right hand 1 on the upper scale of the slide we now read off the angle of sight, in this case $37\frac{1}{4}$ minutes.

When working in metres the formula becomes

$$m = \frac{3758\ h}{R}$$

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In this case we take the nearest division on the rule, viz., 3750, which will be quite good enough for our purpose.

It will be noted that there is no necessity to convert metres into feet before we proceed with our calculations.

For quickness in operation it will be found a help if 1140 and 3750, both on the right hand half of the upper scale of the slide, are marked with red ink.

Incidentally the formula

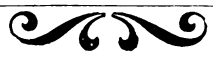
$$m = \frac{1146\ h}{R}$$

boiled down to

$$m = \frac{12\ h}{\text{number of hundreds of yards in the range}}$$

is useful for pencil calculations in the field, and parallels the formula given on p. 148 of A.T., Vol. II, for use when contours are in metres, viz. :—

$$m = \frac{40\ h}{\text{number of hundreds of yards in the range}}$$



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"THE FIGHTING FORCES."

By MAJOR-GENERAL SIR JOHN HEADLAM, K.B.E., C.B., D.S.O.

THE advent of a new service magazine is always welcome to the soldier who takes an interest in his profession—and what gunner does not?—so it is only fitting that the Journal should give a friendly greeting to "The Fighting Forces," the first number of which has just appeared.

Some may be inclined to wonder whether the field is not already overcrowded. But, in matters literary at any rate, there is truth in the old adage that the appetite grows by eating. And after all the number of such periodicals is small compared with the mass of material. We have to begin with the Journals of the United Service Institutions, but these make no attempt to be anything but severely professional, and offer few attractions except to the serious student. Next in order we may place the "Army Quarterly," on which, although no longer in any sense official, some considerable portion of the mantle of the pre-war "Army Review" would appear to have fallen. It provides an admirable meal, but here again on the heavy side, in spite of the appetising "hors d'œuvres" of the Editorial paragraphs. It must be confessed too that its somewhat austere aspect, combined with its bulk, is little likely to allure the casual reader. There remain only our own Journal and that of the Cavalry. The latter makes a frank appeal to the eye with its bold type and wealth of illustration, and its contents show that soldiering and sport go as well together in the pages of a magazine as in actual life. What a pity it is that in our own Journal this combination has always been such a stumbling block and bone of contention!

The above is but a slender list, if the diversity of the interests which come within the scope of the fighting forces of the Empire is taken into account. Continental powers have, for the most part, but one or two serious military problems to consider; and the experience of the great majority of their officers in times of peace is limited to life in European garrison towns: we have all the world for our oyster! There is no limit to the variety of the conditions which the units of our "far-flung fighting line" may be called upon to face, while our officers are constantly called upon to show their adaptability in such diverse tasks as the exploration of unknown countries, or the administration of savage peoples. What service in the world can offer such variety of sport, and of incidents of all sorts worthy of record?

There is material here and to spare, and it must be confessed that Colonel Whitton, the editor of the new venture, has provided a most

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attractive menu. Variety is obtained by a due attention to the claims of the three services catered for, and by a nice discrimination in the choice of dishes. The first is a masterly survey of the "European Outlook" by Professor Pollard, who, needless to say, writes with unimpeachable authority. And if some may consider his attitude too coldly critical of French policy and methods, and too little sympathetic with French difficulties and disappointments, they may turn with relief to the paper which follows. In this Général Fonville makes an eloquent appeal for that "Security" which is so vital for France, and readers of the Royal Artillery Journal, who saw for themselves what our Allies suffered, will have no difficulty in responding to the General's plea for understanding on the part of England. Those who find it hard to realise fully the position of France, with only a boundary fence between her and her ruthless neighbour, may well ponder over the articles on our own air situation by Admiral Kerr and General Groves. There they will see how sensitive we ourselves are becoming, now that the protection of the "Silver Streak," on which we have so long relied, is ceasing to be effective for our own security.

"Silladar" writes thoughtfully and moderately on the thorny subject of the "Indianisation" of the Indian Army; and we are promised in a subsequent number an account of the African Army of France, in which we shall no doubt learn how our neighbours have dealt with similar problems. To both countries their Native Forces are of vast importance, and if we have in the past employed our own somewhat half-heartedly in Europe, France has no such scruples: her security rests on being able to bring to the defence of the Rhine the men from Algeria and Tunis, from the Congo, the Niger, and Central Africa! We are to hear, too, of her famous "Foreign Legion," round which so many romantic legends have gathered since Ouida delighted a former generation with "Under Two Flags"—legends to be tragically revived in recent years, when comrades of our own found in its ranks the opportunity to redeem their honour. The story of another curious survival, the military forces of the Pope, told by the Duke of Stackpool, will recall to many the sudden transition into the very atmosphere of mediaeval romance, as they stepped over the threshold of the Vatican, and found themselves confronted by the halberds of the Swiss Guards.

In the special "Jubilee" number of our own Journal Lord Horne has just impressed upon us the importance of the influence of history and tradition, and this subject is naturally not neglected in "The Fighting Forces." We have heard so much in the last few years of the relations between the political and military authorities during the recent war that we can take more than a casual interest in the methods employed by the great Lord Chatham in dealing with his Admirals and Generals.[1] We may hope too that Professor Williams'

[1] Those who have not already read General Edmond's admirable exposition of the principles involved, are referred to his article on "Generals and the Government" in the Army Quarterly for January, 1923.

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direct contravention of the opinion expressed in the "History of the British Army" will bring Mr. Fortescue into the field in defence of his verdict! Our periodical military literature suffers from too general an absence of controversy. The Americans add "pep" to their Journals by their readiness to challenge the conclusions arrived at in both official and non-official publications—and discipline does not appear to suffer.

Colonel Russell, who enjoyed quite exceptional opportunities for seeing below the surface, gives us a vivid sketch of life at the German Court before the war; and Colonel Peacock recalls the tragic story of the loss of the *Captain*. Curiously enough there happens to be staying in the house from which this notice is written one who was probably the last to see that ill-fated ship before she went down, and a detail of some importance can therefore be added to Colonel Peacock's graphic account. As stated there the *Lord Warden*, *Captain* and *Inconstant* were formed in "line ahead" in the above order. Captain Day, who was in the *Inconstant*, and on deck at the time, is able to supplement this by the further information that the *Captain* had closed on her next ahead—the *Lord Warden*— and had had to haul out of the line in consequence. She had thus fallen behind the *Inconstant* and when Captain Day last saw her *she had set her foresail* in order to get up into station. Shortly afterwards the squall mentioned struck the squadron, and so heavy was the wave that hit the *Inconstant* that it caused her to heel until her lee quarter boat was in the water. At this moment the *Captain* must have been still quite close to her, though invisible owing to the thickness of the weather, and Captain Day is convinced that it was this wave, *combined with the extra canvas she was carrying*, which caused her to capsize.

To turn from grave to gay, we have the "Marine in Fiction," which combines both qualities, and the sheer drollery of "Colonel Camelot's Conjecture." Sport claims its full share, and here the first place may well be accorded to General White's admirable account of "Coaching in the Services," suitably illustrated with photographs of our own Woolwich and Aldershot teams. Major Tomes, ably assisted by "Snaffles," is convincing on the value of hunting for Infantry subalterns, and shows too how it can be done at trifling expense; while Lieut.-Commander Davies, of International fame, gives a *résumé* of the history of Service Rugby. The developments of "Auction" are explained with ample diagrams; and a plea is made for Chess as a service game: in the minds of most of us it is associated, I fancy, only with long idle hours on the deck of a trooper. The fact that Major Barnett, in comparing its pieces to the various arms, identifies the artillery with the Queen may, I think, be fairly taken as a tribute to the place in public estimation our batteries won for themselves in the War.

Nor are the interests of the ladies overlooked. An illustrated article on Plymouth commences a series of accounts of service stations, in which the amenities of life for wives and families will not be

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neglected; and in the first instalment of "When the Harness is Unbuckled" the married officer of moderate means is told how to house himself on retirement. But I am afraid the sympathy of the writer is all with the suburbs, or at any rate with what we, who live in what she calls "the wilds," consider such. May I put in a plea for *the real country?* The retired officer, and his wife, will find far more opportunities of useful occupation there, and possibilities of sport undreamt of in the more populated districts.

In conclusion it only remains to say that the adventitious aid of an attractive "get-up" has not been disdained. The cover is well designed, and paper and print are both excellent. A special word of commendation must be reserved for the illustrations, particularly as that selected for the frontispiece is a charming representation in colour of our Horse Artillery crossing the Bidassoa in 1813. It is true that it is labelled "Sea Power," but if the title seems a little far-fetched, we may well let that pass in view of the regimental interest of the scene. One word however of serious criticism. Surely the sub-title is, to say the least, scarcely felicitous?

"A QUARTERLY MAGAZINE

- *for* THE ROYAL NAVY -

- - THE ARMY *and* - -

THE ROYAL AIR FORCE."

Such a combination however technically correct seems calculated to give the impression that the Army had retained, with the red coats of Cromwell's regiments, their anti-monarchial prejudices! We do not toast "The Army and *Royal* Navy," or belong to an "Army and *Royal* Navy Club," so why accentuate the difference in expression here?

It remains only to wish, in the name of the Royal Artillery Institution, which has just published the 50th volume of its Proceedings, a hearty welcome to the last-joined recruit to the ranks of Military Journalism.

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THE TALE OF A BUTTON.

Reprinted from "The Royal Army Ordnance Corps Gazette," March, 1924.

COMMENTING on the curious fact brought to notice by a contributor, that our badge is worn by the H.A.C., we lightheartedly volunteered last month to explain the coincidence. Rash undertaking! The path of research is long, winding back almost to the beginnings of English history and it is largely uncharted, though really in a region belonging so peculiarly to the august Board of Ordnance one might have counted on a decent Ordnance survey map of the Country. However, though we may stumble here and lose our breath or bearings there, though we may sometimes err in our dates or have to offer "brilliant guesses" for solid statements, this attempt will have served its turn if it brings in pathfinders more skilful, whether from the Corps or the Honourable Company, to make the rough places smooth.

First, be it known, we are not speaking of the H.A.C. badge proper. These Arms, worn for centuries by the Company, as the Royal Licence which in 1821 first formally gave the right to bear them declares, are a noble heraldic device but have no resemblance to ours. The reference is to the badge of the Corps and to that worn on the buttons in the Artillery Division of the H.A.C., and they both derive, in our case directly, in the case of the Company indirectly, from the Arms of the Right Honourable and Honourable the Board of Ordnance.

The origin of these Arms is lost in the mists of antiquity. Quite certainly they were worn many a long year before Royal Warrant in 1806 authorised their use—a fact vaguely hinted at in the Warrant itself which speaks of the Arms, hitherto used by the Board. A suggestion that these were the family Arms of some Master-General of Ordnance hangs in the air without any evidence, and, even were it possible to trace up the devices of all in the illustrious and long succession who have borne this high office of State, it is most unlikely that they would be found belonging to any family, however noble. Guns, as the motto of many an old field piece has it, were "ratio ultima regum"—the supreme argument of Kings—and such a masterful monarch as Henry VIII for instance would scarcely have brooked the usurping of a royal prerogative by any individual subject. May we surmise that here as in so much else the powerful Board was a law unto itself and regarded its choice as sufficient and final authority?

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The origin and meaning of the scrolled motto "Sua Tela Tonanti" is also obscure—but too much and too little have been written about this in the Gazette already and we shall never know the real significance of the words until we have discovered the text from which they come.

Our own title to the Arms is sun clear. Our very name of "Ordnance" is in evidence; our function, the supply of war material and equipment, is akin to that of the Board, in a more circumscribed sweep no doubt; for the latter, so far as material is concerned, combined the powers and responsibilities of the modern departments of Master-General of the Ordnance and Quarter-Master-General; but the duties are in essence the same, and, be it added, it was this function of supply, and not that of training, which first called the Board into being. And long before the Board was established in the Tower of London in the middle of the fifteenth century, "Officers of th' Ordinaunce,"—Master Carpenters, Master Smiths and the like—were carrying out these same duties under the Lieutenant Governors of Counties, who were responsible to the Sovereign for the supply of munitions. These Officers with their personnel of Artisans and the Clerks of the Ordnance were thus the prototypes of our present day Corps. Of all the Corps, then, which were controlled by the Board, none is so closely connected with it as our own. What wonder that, with the abolition of the Board in 1855 and our own emergence subsequently as a separate Corps, we inherited the badge together with the name of so many of the duties for which the Board was in the first instance responsible.

The date when the badge was first worn is uncertain. No doubt all Ordnance soldiers wore it while the Board held sway from the time that the Arms were first devised, but during the chequered phases of evolution through which the Corps passed after 1855—Store Branch, Military Store Department and Staff Corps, part of the Control Department (1869) and Army Service Corps (1875)—it may well be that the badge went out of wear. But when, soon after the last mentioned date, the term "Ordnance" was revived and four Companies were withdrawn from the Supply and Transport branch to carry out Ordnance duties as the Ordnance Store Corps, we may imagine that the honoured emblem was restored.

The Corps badge includes the Arms of the late Board, but not the crest, supporters or scrolled motto, though this latter is now of course the motto of the Corps and it is surmounted by the Crown. But when and why crown and motto were bestowed is known to all.

While the raison d'être of the Board of Ordnance was, as we have seen, first and foremost the supply of war material, it soon reinforced this function by that of training, so that its full scope must be represented by adding to the other Departments we have named that of the Adjutant-General and even of the Paymaster-General—for it had a P.M.G. of its own. What was the nature of the personnel it controlled? As guns and other great engines of war—cranes, catapults, battering rams and the like—were its chief care, and as these were

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used almost exclusively for reducing strong places,—all who were concerned with cannon or in any branch of seige work and fortification—whether as fighters or workers—were Ordnance men and formed one body. In this the Board followed the old procedure of war-time when a fortress was to be demolished or a town besieged. We hear for instance, in the siege of Calais by Edward III in 1347, of one John Gruynard, a "Chief Engineer" moving out with over 300 carpenters, smiths, tentmakers, engineers, armourers and gunners. In the same way the Board supplied, trained, controlled and paid all gunners, ordnance artificers, sappers and miners who with civilian artisans of various callings attached formed one Corps, the "Ordnance Corps,"—a formation which held until in 1716 the Duke of Marlborough separated the two scientific Corps. Our association with these two Corps—especially with the Artillery—was thus a long and very close one—a fact curiously illustrated in the older meanings of the very designations "Ordnance" and Artillery." Just as the former term, when used of personnel, once covered gunners and drivers as well as ourselves, so the latter, as applied to material, had a much broader range than to-day, being used where we should now employ the word ordnance. Derived from an Italian word meaning originally archery, the word was for a long time used loosely for all warlike missiles and implements. If then we read in the Authorised Version of the Bible, translated in the reign of James I, that Jonathan "gave his artillery unto his lad, and said unto him: 'Go carry them to the city' " (I Samuel xx, v. 40), we are not to suppose that he was exacting a herculean task from the boy, but merely handed over to him his bow and arrows.

For long years then, Ordnance and Artillery served together under the Board and when that Department ceased to be, we need not be surprised to hear that the gunners in memory of their ancient service continued to wear the Ordnance badge with its three primitive guns and cannon balls until a more modern field piece was adopted. The date of this introduction can no doubt be easily verified; a correspondent has obligingly furnished the information that on his enlistment into the R.A. in 1878, the "three gun buttons," as they were called, were still being worn by many old soldiers. The full arms of the Ordnance with crest, supporters and motto complete may be seen to-day at the entrance of the R.A. Officers' Mess in Woolwich, while the crest and motto are used on the note paper of the neighbouring Royal Military Academy.

It is in the Royal Regiment that we find the connecting link between ourselves and the Honourable Artillery Company. Not that the H.A.C. were ever directly connected with the R.A. or under the control of the Board of Ordnance. Their historian, G. A. Raikes, writing between 1878 and 1880, rightly claimed that they were entirely independent and self-supporting, the only military body over which Parliament exercised no control, receiving no pay from public funds and being governed by Royal Warrants confirmed by succeeding

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Sovereigns from the time of Henry VIII. True, the claim does not stand to-day, as the Regiment now comes under the Territorial Act, though with precedence over the whole of the Territorial Army and secured by a special clause in the Act to the enjoyment of the considerable property which it has accumulated in the four centuries of its existence.

Incorporated in 1537 by Henry VIII from among the archers in and about the City of London, under the title of the Fraternity or Guild of St. George, the Company appears at a very early stage of its history to have adopted the use of Artillery proper, both small and large, and became known as the Artillery Company, the designation "Honourable" not appearing in its records or in Royal Warrants until a much later period. From the outset the Company came into close association with the "Gunners of the Tower" or "Fraternity of Artillery" under the Master-Gunners of the Tower. They were long the only two bodies who practised and taught the use of artillery and they trained on the same ground, the "Old Artillery Garden" at Bishopsgate, until about a century later the Company acquired a training ground of its own, the "New Artillery Garden" at their present Headquarters in Finsbury. Their function, their great skill in gunnery and their proximity to the Headquarters of the Board of Ordnance brought them naturally enough under the attention of this body, and the records of the H.A.C. contain many instances of the lively interest taken in the Company by various Masters-General. Thus, when the Guild of St. George was created, Sir Christopher Morris, then Master of the Ordnance, was appointed overseer of it and "of the science of artillery or long bows, cross-bows and handguns," eventually being appointed Master or Ruler for life. Later on we find the Master-General lending the Company field pieces for gala days. In 1629, by which time the Artillery Garden was enjoying a great name as a school for gunners, Horatio Lord Vere, the Master-General of Ordnance, is recommending a member of the Company, "John Spencer to the Lords of the Admiralty as gunner in one of the new ships, as amongst other qualifications he has been a scholar in the Artillery Garden." The Master-Gunner of England also recommends him as being "able to do well at the tail of a piece of Ordnance." These quotations throw an interesting side light on the attention paid to the Company by our old Chiefs and to the practice that was common before the formation of a special Corps of Sea Gunners, the R.M. Artillery, of sending out gunners, trained by either the Ordnance or the H.A.C., to serve on ships of war. Thus the gunners of the two competing schools prolonged the association and the rivalry created in their training, as they served and worked side by side at sea, and we may imagine that the distinctive gunner's emblem worn by one of the two parties formed the subject of some lively disputation in their leisure moments.

Have we in the amphibious habits of gunners in early days a clue to the old artillery term matross (Ger. matrose = a sailor) which was

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applied to a new division of the Company formed in 1780? An old military dictionary (1779) defines matrosses as "properly apprentices to the gunner, being soldiers in the Royal Regiment of Artillery, and next to them, they assist in loading, firing and spunging the great guns." Perhaps the term arose at sea from the allotment to ordinary sailors of the subordinate duties of the gun crew under the trained gunner.

This Matross Division applied and were allowed in 1798 "to wear on the breast plate and buttons a shield with the arms of the Office of Ordnance; as worn by the Royal Artillery, surmounted with the Prince of Wales' feathers, and at the bottom a scroll with the words 'Hon. Artillery Company.' "

The plumes, the distinguishing difference from the Ordnance badge, are also part of the regimental arms which it is supposed were granted by James I, the feathers evidently betokening the interest which his son, the Prince of Wales (the ill-starred Charles I), took in the Company of which he was for a long time Captain General, and as many other Princes of Wales also held this office, the device was very appropriate. Somewhere about 1912, the Matross Division became known under its present designation of the Artillery Division of the H.A.C., but the same button—ball shaped like that worn by horse gunners in the Royal Regiment—was worn by them until on the accession of George IV, Captain General of the Company for several years, the Royal Cipher was assumed in 1821 and the plumes no longer used.

Thus the badged button which H.A.C. gunners wear and which we, too, by grace of the new regulations, are to wear in our walks abroad, carries many old and proud associations.

W. J. A.

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FOREIGN IDEAS ON THE SUBJECT OF ARTILLERY.

By COMMANDANT LAURENT.

(*Revue d'Artillerie*, March, 1924.—Le mouvement des idées à l'étranger en matière d'Artillerie.)

Translated by BRIG.-GENL. W. EVANS, C.M.G., D.S.O.

MAJOR LAURENT'S articles are always very interesting and instructive and although an article on this subject by Major V. Drake Brockman appeared in the May Journal there is a good deal in this article worth reading.

* * * * *

The armies of America and Germany are the first that should be examined. The United States, owing to their lack of a gun of their own have been led to the study of a complete *system* of artillery. The cleverness of the American constructors and also be it said the wealth of their country has allowed them to progress considerably.

As for Germany, thanks to the action of the Commission of Control, she is short of material; since she is unable to construct (except secretly) she has devoted herself to theoretical study. Her intellectual activity is intense, particularly as regards organization and employment and she has just published a complete set of training manuals based on the lessons of the great war. One must admit that her experience is great as she waged war on such very varied fronts, and on this account her organization and employment are worthy of study. . . . .

In the U.S.A. we find an absolutely post-war system of artillery. For the Americans one of the principal lessons of the war (if not *the* principal lesson) is that even if you can train men in a few weeks and officers in a few months, on the other hand it takes a very long time to put in hand the construction of artillery material. In 1919 General Hinds, who had commanded the American artillery in France, spoke as follows in the Senate at Washington: "If we had not been able to get guns from France and England we should have been a negligible factor in the war till the end of 1918. When the Armistice was declared we had not one single gun in the divisional, corps, or army artillery that had been manufactured in America." He added that thanks to a programme now being carried out, the U.S.A. artillery would shortly possess a reserve twenty times as powerful as that in existence previous to the war—viz.: about 5000 75's and 5000 heavy guns and howitzers, an armament more numerous, and of much better quality than that of the Germans in 1914.

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Since the armistice the Americans appointed various committees to study the lessons of the war. One of them was to study "calibres and models of guns, nature and quantity of munitions as well as methods of artillery transport with a view to their application to an army in the field." This committee (president, General Westervelt) met at Chaumont on January 12th, 1919, and was able to visit Italy and England. Its report was complete by May 5th, 1919, and was published in the press almost in its entirety. The main points of this report are as follows:

(1) Divisional artillery—should be first and foremost mobile; it should comprise solely light guns and howitzers having the same mobility (weighing 200 kg. with limbers); field gun should have a range of 15,000 yards.

(2) The infantry accompanying gun should be of a special type, very light, on low wheels, capable of firing accurately up to 2500 yards a H.E. shell, calibre about $2\frac{1}{2}$ inches.

(3) Counter battery work is the task of the corps artillery who must also undertake harassing fire, and fire to deny localities at ranges beyond that of the divisional artillery. The army corps should therefore possess heavy guns and howitzers; in addition it must have anti-aircraft guns.

(4) A general reserve is necessary; it must contain in addition to units of field artillery, special groups and batteries (mountain artillery, trench artillery, super heavy guns, etc.)

To sum up, six natures of weapon are sufficient for the normal tasks of an army in the field:

For the division:

Two light pieces with the same carriage ... ... { a 3″ gun / a 4″ howitzer

For the army corps:

Two medium pieces also with the same carriage ... { a 4″ gun / a 6″ howitzer

And two heavy pieces still with the same carriage { a 6″ gun / an 8″ howitzer

That is to say *four* calibres 3, 4, 6 and 8 inches and only *three* carriages.

We may note here that this report states that the 155 Schneider met with the approval of all the allies.

The commitee is distinctly in favour of split trail carriages (types Deport and Filloux): they demand increased ranges; above all they demand mechanical traction, particularly by tracked vehicles, and are studying the organization of an entirely motorized system of artillery.

In addition the committee proposed that the guns of divisional and corps artillery should be used against aircraft, and to enable this to be done that they should be capable of being elevated up to 80°; special A.A. guns should be of two calibres with m.v. about 2,500 f.s.

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Howitzers should fire up to 65°. Nearly all guns should be able to shoot with a traverse of 360°.

The recommendations of the committee were accepted in principle, and the construction of experimental material was commenced. Difficulties soon arose; the range was generally attained but the field of fire led to complications, and to very heavy mountings; a carriage common to the gun and howitzer was found very difficult to arrive at (except for the 6″ gun and 8″ howitzer which were mounted on a carriage very similar to the Filloux carriage). It was found that field guns could not be adapted to anti-aircraft fire and that therefore there was no necessity for elevation beyond 45°, nor for an all round field of fire. Thus certain of the principles laid down by the Westervelt committee were gradually dropped. There exist a series of models of 1920, 1921, 1922 and 1923 that illustrate this. For example the 1920 model was constructed in accordance with the recommendations of the committee; the split trail allowed of 80°, but it was much too heavy (about 27 cwt.); the following year another carriage with the ordinary trail weighing 800 lbs. less was constructed; however the advantages of the split trail were undeniable, and experiments were made to lighten the carriage, and as the excessive elevation was given up this was possible and the 1923 model was produced (about 24 cwt.).

To turn to the question of motorization, the recommendations of the committee have been loyally followed. Inventors of the "caterpillars" the Americans have continued to improve them. Since 1919 they have brought out new types notably rubber tracked models with powerful motors giving a speed of 25 m.p.h. Nowadays some tracked vehicles are as fast on the roads as wheeled tractors. In addition the new tracks have a life of 1600 kilos. They have produced now a very smooth and silent track they call a *snake;* so from caterpillars they have arrived at snakes. Here we may mention that the Americans are greatly interested in the Citroën-Kégresse rubber tracked vehicles. They seem to have given up combined vehicles furnished with wheels and tracks like the St. Chamond lorry, or vehicles on wheels capable of fitting into a track like the Christie machines. As the weight of mechanical vehicles is still great, the question of crossing rivers had to be considered. They have succeeded in getting caterpillars through water over 3 feet deep and talk of a water tight vehicle to cross rivers . . . .

Several types of self-propelling carriages for divisional artillery have been tried; their weight is less than four tons, this being the limit of the pontoon bridges carried by cavalry divisions. Experiment proved that the first types were too fast, and that $12\frac{1}{2}$ miles per hour was quick enough—a new type is being experimented with, however the committee has come to the conclusion that self propelling carriages should only be used for accompanying or anti-tank guns and not for divisional artillery.

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The Americans are the champions of motorization—they have oil fields at home and in Mexico, they use mechanical vehicles to a great extent in trade and in farming which could be requisitioned, and at the same time they could recruit far more mechanics and chauffeurs than men accustomed to horse management. There is one motor in the U.S.A. to every eight inhabitants, and in 1923 they manufactured over 4 million mechanical vehicles.

As regards *mountain-guns* the committee asked for a 3″ calibre and a range of about 4700 yards. Before an experimental weapon had been completed they heard that foreigners were producing a weapon ranging up to 8800 yards, so they at once started on a pack howitzer having this range.

The *accompanying gun* has not yet been arrived at. The Westervelt committee wanted a $2\frac{1}{2}$ inch gun, light, and capable of being also used as a howitzer. Experiment proved that this was difficult, and they came to the conclusion that they must have a special weapon for engaging armoured vehicles. Now they are considering a 3″ mortar and a $1\frac{1}{2}$″ gun of very high muzzle velocity.

A few technical details:

The Americans favour the French process of *auto-frettage*, which hastens manufacture and lessens the weight of guns. They have adopted buffers of the French type. Standardisation is always aimed at. Experiments are being made with ball or roller bearings specially for the trunnions. A smokeless, flashless damp-proof powder is being tried. . . . . While they are waiting for new guns the American army possesses guns of many models, mainly French (75 gun model 1897, 155 Schneider howitzer, 155 G.P.F.).

An American *infantry division* on a peace footing consists of: 2 infantry brigades (4 regiments) and 1 artillery brigade (2 regiments F.A. each of 2 groups of 3 batteries of 75$^{m/m}$ guns). On mobilization the division will receive a regiment of 4″ howitzers (when these guns are constructed). The 6″ howitzer is classified as corps artillery.

A word as to the *Coast Artillery*. The Americans having nothing to fear for their land frontiers, have largely considered the defence of their coast. Before the war the coast artillery took precedence of the field, and got the best recruits. The war reversed this for a time but to-day the old tradition again obtains, and the personnel of the coast artillery is quite on an equal footing to that of the field artillery. The coast artillery run all guns of the inland or coast defences whether fixed or mobile, the railway artillery, tractor drawn heavy artillery, anti-aircraft artillery and trench mortars. The railway artillery is most important for to it is entrusted to a great extent the protection of the coast line. An interesting point arises here: as the effective range of a heavy gun is far in excess of the distance to the sea horizon, aerial observation has to be made use of. The power of modern guns is indeed very great. In 1921 Colonel Jenks wrote in Army Ordnance "If you want to economise in the construction of coastal fortifications you must arm them with guns that are at least 20 years

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in advance of the probable naval armament." We do not know if this principle has been accepted, but can only report that a 16 inch gun on a railway mounting is in use; this is the heaviest railway gun yet made.

Germany. (Much has been recently written on this subject and most readers know the 7 division artillery organisation, so I do not translate this in full, but merely allude to the less generally known points.)

To-day the German artillery handbooks have been completed—they are in pamphlets, the last to appear being dated 1923—their training is intended for a modern army provided with the most modern artillery of all natures.

The Germans are much interested in motorization. This is natural as they suffered very much at the end of the war from their inferiority in this respect. Whereas the allies had 200,000 mechanical vehicles, the Germans had only 40,000. Owing to the blockade they were short of nickel and rubber, and their factories had to give precedence to armoured cars, aeroplane motors, submarines, etc. Now they have a small army the Gremans realize how motorization compensates for weakness by very great mobility.

The fact that they have arrived at a motor spirit produced in the country encourages Germany to proceed on these lines. At the commencement of 1922 there was put on the market under the name of *Reichskraftstoff*, or *tetralit-benzol* a mixture of 50% benzol, 25% alcohol, and 25% tetraline or tetrahydro-napthaline. These are extracted from German coal; it is true that the occupation of the Ruhr reduces this by about 75%. A German, Bergius, claims to have arrived at the production of synthetic petrol from coal; apparently his claim is justified, to judge by the capital subscribed to the company exploiting it. (See the *bulletin belge des Sciences Militaires*, April and May, 1923, for articles on the "berginisation" of coal.) . . . .

. . . . Shrapnel shell has practically been given up since 1917, Ludendorff in his memoirs writes: "The training of the troops did not admit of such a method of fire. H.E. shell with instantaneous fuzes were always used in preference." The Reichsheer actually possess some shrapnel and has methods of ranging laid down, but it appears that this nature of shell has just been given up, in spite of protests from many officers. Gen. Rohne in the *Artilleristische Monatshefte* has long advocated the use of shrapnel, particularly in moving warfare. Some, too, demand a shrapnel shell for the infantry gun. Doubtless it has been given up as being too difficult for the next grand army where the 100,000 professional soldiers of the Reichsheer will be swamped by a mass of reservists . . . .

A document dated September 25th 1921 detailing the composition of an infantry and cavalry division in a modern army is interesting as showing (on paper) motor traction for half the divisional artillery.

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To the criticism that to confide such a large proportion to tractors was inadvisable, a German artilleryman replied that the roads in Western Europe encouraged the use of motor traction, and that the great operations of 1914 in France, the enveloping manœuvres in East Prussia, the Russian campaign and those of the Balkans and Italy, and finally the 1918 offensive in the West and the fighting in retreat consequent on it all went to prove the necessity for even divisional artillery to be capable of moving far and fast.

As far as research work is concerned, like the Americans the Germans would like a carriage common to guns and howitzers, the other points arrived at are: greater range, obtainable by lengthening guns, and perhaps increasing the calibre of the field gun; longer life for guns by use of liners, and perhaps higher rate of fire.

Research is probably carried out abroad. Bofors in Sweden, possesses a small factory which works for Krupp, and though it would not be capable of constructing a mass of guns for Germany would appear to be constructing new types of guns, which the commission of control will not allow to be manufactured or experimented with at home.

* * * * *

Belgium.

At the end of the war the Belgians found themselves in possession of a very large number of captured German guns up to the 14″ gun on railway mounting. They have retubed the German 77$^{m/m}$ of 1916 and altered it to 75$^{m/m}$ chambered to take the French cartridge, and call it the 75 G.P.3.

* * * * *

Tcheko-Slovakia.

Here is the Skoda factory at Pilsen which has produced during the war and since the armistice many interesting guns. The most successful are the mountain guns of calibres from 75 to 210; Germany and Italy have adopted the 75 model 1915. Heavy guns are self propelled and can move either by road or on the railway—this is what Skoda calls "traction C." Each carriage has double wheels, the inside tire to run on the railway, the outer of rubber to run on the road. Each wheel is governed by an electric motor. A tractor with a petrol motor of 150 h.p. tows the vehicles and has a dynamo to provide the current to actuate the wheels of the carriage. Skoda has produced several accompanying guns of the mountain howitzer type.

Schneider & Co. are now working with Skoda . . . . so that this is to the great advantage of France.

* * * * *

The Poles, Rumanians and Serbians have a very mixed equipment . . . . they appear to favour French models with 4″ or 5″ light howitzers and Schneider or Skoda mountain guns added.

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Before the war *Italy* possessed many natures of gun—generally of foreign design constructed in their own military workshops, or in the Vickers-Terni factory at Spezzia. During the war new models were adopted: the French 75 model 1897 and various Schneider guns and howitzers, the English 6″ howitzer, their own 305 mechanical drawn howitzer, the heavy railway artillery 14″ gun, and a great number of captured Austrian guns (specially the Skoda 75 mountain gun, and the 4″ howitzer). These are all still in use.

The Italians are very good at gun manufacture and towards the end of the war discovered a special kind of steel which simplified and reduced the time taken in the production of artillery material. Italian divisional artillery consists now of howitzers as well as 75$^{m/m}$ guns. All heavy artillery is mechanical—they use a 65$^{m/m}$ mountain gun as infantry accompanying gun—this may be replaced by the 75$^{m/m}$ Skoda gun—they are very much in favour of super heavy guns. As regards employment they are inclined to allot (as did the Germans) part of the corps artillery to divisions.

The *Swiss* were well situated to learn lessons from both belligerents—the failings of their Krupp guns became apparent—various experiments were carried out to find the best means of transport for such a mountainous country.

* * * * *

Great Britain. Major Laurent is inclined to think Great Britain's military organization has benefited less than other nations from the lessons of the war—he then describes our methods.

* * * * *

In *Russia*, the Soviet Republics take a great deal of interest in French methods, but seem to put more faith in the use of aircraft, motor traction, armoured trains, and gas, than in artillery.

* * * * *

Major Laurent then proceeds to sum up at some length the inferences he has drawn. His main point is that everyone aims at: Longer range, even if field guns are made heavier; lengthening the lives of guns which are shortened by high muzzle velocities; using means of checking recoil on the French buffer systems; increasing the field of fire laterally and vertically; speeding up manufacture of guns in mass; standardisation of breaches, and of laying apparatus.

He again lays stress on the system of "auto frettage" as permitting guns to be made in one piece. This would speed up gun manufacture and should be of great interest to Germany who would have to construct a new armament.

He then shortly reviews the changes that have occurred in the last ten years—he considers that the post war gun is or will be a single tube running in a sleeve and with a renewable liner . . . . the importance of motorization is accentuated in countries short of men and horses . . . . where petrol does not exist countries are carrying out researches to produce a national motor-spirit.

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ARTILLERY FIRE.

Reprinted from "The Coast Artillery Journal," March, 1924.

The following paper concerning the volume and effect of artillery fire in modern warfare, and the types of cannon developed during the war, was recently delivered as a lecture to the officers of the Advanced Course, Coast Artillery School.

ARTILLERY has no independent role on the battlefield. It is there to deliver defensive or counter battery fires, to prepare for the infantry attack and to accompany and cover the attack. The Field Service Regulations states "Victory is won only by the combined employment of all arms in battle . . . . The full utilization of mechanical devices for military ends prevents useless sacrifices and conserves man power."

It is believed that full utilization of these mechanical devices can be made only by those who have an accurate conception of the powers and limitations of them. All of you have heard anecdotes about absurd calls made on artillery by staff officers and troop commanders. But it isn't only they who are poorly informed. There are many illustrations of bad judgment on the part of artillerymen.

The importance of artillery in modern battle is illustrated forcibly by consideration of the quantity produced on both sides between 1914 and 1918. France in 1914 had on hand

> 3840 75's with 1300 rounds of ammunition per piece and a programme for daily manufacture of 13,600 rounds, and 308 pieces of heavy artillery.

At the end of the war she had 4968 75's with daily ammunition production of 200,000 rounds and 5128 heavy cannon.

Germany had on hand in 1914, 5400 pieces of "field artillery," and 2020 pieces of "heavy artillery," while at the armistice she had 11,948 pieces of "field artillery" and 7850 pieces of "heavy."

The following figures as to the expenditure of ammunition in various battles will still further accentuate this growing importance:

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1863	Chickamagua	2 days	duration	Union Army	7320 rds.
1863	Gettysburg	3 ,,	,,	Union ,,	32781 rds.
1870	St. Privat	1 ,,	,,	German ,,	39000 rds.
1904	Nan Shan	1 ,,	,,	Japanese ,,	34047 rds.
1904	Liao Yang	9 ,,	,,	Russian ,,	134400 rds.
1904	Shan Ho	9 ,,	,,	Russian ,,	274360 rds.
1915	Neuve Chapelle	3 ,,	,,	British ,,	197000 rds.
1916	Somme	7 ,,	,,	,, ,,	4000000 rds.
1917	Messines Ridge	7 ,,	,,	,, ,,	2753000 rds.
1918	St. Mihiel	4 ,,	,,	U.S. ,,	1093217 rds.

With such masses of artillery and such volume of ammunition expenditures the artilleryman must inform himself in order that he may at all times be able clearly to demonstrate to the less well informed any wasteful or improper employment of his cannon. In other words he must know both the powers and limitations of his weapon.

To complete the picture I will give you two more sets of figures, the percentage of casualties due to artillery fire in various wars and the ratio of casualties to ammunition expenditures :

War.	*Nation.*	*Percent. of Casualties due to Artillery Fire*
Crimean	French	45%
1870	French	25%
1870	German	9%
1914	German	75%
Verdun 1917	German	77·2%
Picardy 1918	German	51½%
1918	German (3, 4, 6, 10th Armies)	68%
Russo Japanese	Japanese	8½%
Russo Japanese	Russian	14%
World War	American	80%*

Figures concerning German Artillery ammunition fired on the front occupied by three French Armies during five months of 1917, at a time when German artillery was at its maximum efficiency, show that a total of 3,609,000 shells were fired by the Germans. 13,265 French are reported to have been killed and 55,412 wounded by artillery fire during this period. This gives a ratio of one casualty for every 54 shells and one death to every 271 shells. Assuming an average of 22lbs. per shell this would give one killed and five wounded men for each three-ton truck load of ammunition.

Making some very broad assumptions some statistician has estimated that on all American fronts in 1917, the ratio of American casualties to German shells was one to fourteen.

The section of Artillery Notes included in your reading gives data accepted as to the destructive effect of various calibres and types of artillery.

* Includes 90% of all gas casualties. 27·3% of American casualties were from gas.

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These and the data above as to casualties are not matters to make us over proud. They show plenty of room for improvement for both the ordnance and artillery but they are figures we must accept until we can prove we can better them. And we must admit them to the other branches. And they particularly emphasize the fact that in the general case destructive fires do not justify themselves and that the most efficient employment of artillery both with and without gas is neutralization during critical periods. Fire for destruction except in very special cases is an unwarranted extravagance.

Standard artillery equipment on hand or in reserve.

Number	*Type*
113	2·95″ Mountain Guns
5573	75$^{m/m}$ (3854 French type)
200	105$^{m/m}$ Hows.
300	4·7$^{m/m}$ guns
200	60-pdrs.
3009	155$^{m/m}$ Hows.
100	6″ guns, Mk. XIX
2090	155$^{m/m}$ guns (G.P.F.)
516	8″ Hows.
45	9·2″ Hows.
320	240$^{m/m}$ Hows.

Of the existing material the most important from the standpoint of tactics of the combined arms is the 75$^{m/m}$ gun. As laid down by the Calibre Board the ideal supplementary weapon is a howitzer of about 105$^{m/m}$ calibre. We have but 200 of these. Too few to be given serious consideration. The 155$^{m/m}$ howitzer used during the war is heavy and its ammunition cumbersome. As a consequence our present divisional artillery has organically no howitzers but in all service schools it is generally assumed that for a division acting alone the 155$^{m/m}$ howitzer will be attached. The cases in which divisions within a corps will or will not have howitzers attached will be covered in your course at Leavenworth.

We have on hand about 1700 British and American type 75's but for purposes of our study here their differences from the French type are of no vital importance; we base our work on the French. This gun is 34·5 calibres in length and is designed to fire a 12·3 lbs. shell with m.v. of 1930 f.s. to a range of 9350 yards. The shrapnel for this gun weighs 16 lbs. and has a range of 7440 yards. The gun has an axle traverse on the carriage of about 6°; it has an independent line of sight and an elevation, without digging in the trail, of 19°. The recoil is of the hydro-pneumatic type. In firing position, the gun and carriage weighs 2657 lbs.

The 4·7-inch gun, Model 1906, while a very accurate weapon, had too limited a range (8750 yards) to be of prime value. A modified type with an improved projectile has given a range of 14,000 yards. However. of those now available, the number prevents their

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serious consideration in spite of the Calibre Board's fixing a 4·7-inch as the ideal Corps Artillery type.

The 155$^{m/m}$ howitzer, Model 1918, approved as the proper Corps Artillery howitzer, is a splendid weapon within the limitations of its range. It is 15 calibres long, is mounted on a hydro-pneumatic recoil mechanism and fires a 95 lb. projectile with an m.v. of 1476 f.s to a range of 12,300 yards. The carriage provides axle traverse of 6° and has 42½° elevation. It weighs 7600 pounds in firing position.

It is a very satisfactory counter battery weapon and is very effective for smoke screens and gas concentrations. While considered too heavy for ideal divisional employment it gave excellent results during the war and met general approval by the artillery of all the Allies.

The 155$^{m/m}$ G.P.F. gun, Model 1918, is 38 calibres long and is mounted on a hydro-pneumatic recoil mechanism of variable recoil. It fires a 95 lb. projectile with a m.v. of 2380 f.s. to a range of 17,800 yards. The carriage provides traverse of 60° and an elevation of 35°.

While the following quotation sounds like the rhapsody of an enthusiast it is an accurate description, for the gun is, from an ordnance engineering standpoint, the finest product of the war.

"The 155$^{m/m}$ G.P.F. gun has an extreme range of almost exactly 10 miles (16 km.) and a traversing arc of 60 degrees (⅙ of a circle). These are extraordinary characteristics. By virtue of them a single grouping has in one day supported the infantry on the fronts of three army corps. On the other hand, three groupings widely separated in three corps areas have co-operated to fire at one time in front of the infantry of the centre corps.

The gun fires a powerful shell with fuses appropriate to various conditions and produces very severe effects.

The gun is made for long range work. It is accurate for ranges up to about 12 km. but has considerable and increasing dispersion in range as the latter increases. It is very accurate in direction. So far as its shooting qualities go it is very suitable for counter-battery up to about 12 km. Beyond this it is the appropriate gun for harassing, interdiction, prohibitive fire, for destruction of large targets like towns, camps, etc., and for enfilading railroads, trenches, ravines, etc. It is not suitable for destruction of dug-outs or trench systems.

Unfortunately, the gun's life is only about 3000 rounds and it cannot be fired rapidly without decreasing this life. The maximum rate of fire permitted is one round in 1½ minutes. Besides, it is expensive and the facilities for replacement and retubing are not sufficient. The normal rate of fire is one round in 3 minutes. There are several other guns and howitzers suitable for counter-battery at ranges less than 12 km.

In order to save its life and devote it to its best purposes (for which no other gun is at hand) the 155$^{m/m}$ G.P.F. has since 25 September been kept at the disposal of the 1st Army. But not without exception, for a whole brigade of 72 guns was turned over to an army

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corps for one operation, and much counter-battery has been undertaken at the request of various corps from time to time.

The gun has other limitations. Its track is very wide—8 feet. It is very mobile, considering its qualities, but it is slow. Its ammunition is heavy and the supply is difficult. It takes several hours to emplace and some time to prepare for travelling. It often stirs a foolish impatience and resentment among military police, traffic regulators and staffs very unworthy of them. The gun has been and will continue to be a saviour of doughboy lives and I can vouch for it that those who command and serve it are devoted to the support of the infantry as their first duty. Prisoners' testimony is plentiful as to the great effect of artillery in their back areas. The 155$^{m/m}$ G.P.F. is the gun that they testify for in the main."

A good many examples could be quoted from the Army Artillery diary to show failures to use this powerful weapon. For example, fire of Army Artillery south of parallel 288 was stopped either September 27 or 28. Yet this parallel was not reached until 26 October and the jumping off line of 1 November was approximately on it. On a certain part of the front fire was stopped south of parallel 301 on 2 November but no infantry came near that line even on 3 November. There seems to be either an over-confidence as to advances to be made not borne out by experience or an unwaranted fear that losses will be suffered from friendly artillery fire. The latter is often claimed by inexperienced troops, rarely proven and often shown to have been utterly impossible. When it does happen it is not because the advance runs into it but usually through defective ammunition. If shell bursts are in front of the infantry the latter will not run into them. If large areas are to be taken it is ordinarily not worth while to keep artillery fire out of them for fear of injuring a few lost, small patrols.

In the attack of 1 November one corps asked for preparatory fire by 155$^{m/m}$ G.P.F.'s on objectives about a kilometre in front of its line. The fire was delivered accurately and very effectively by a distant Army Artillery grouping. Moreover, fire from G.P.F.'s preceded this corps' attack during a whole day, not as a barrage, but according to a pre-determined programme. See the Boche communique as to the character of the artillery fire and as to the result—a piercing of the Hun artillery position. It is not thought for a moment that the 155$^{m/m}$ G.P.F. should be credited with more than its fair part in the accomplishment. Divisional and corps artillery certainly did theirs also.

The Army Artillery P. C. is always open. The Army Artillery Grouping Commanders maintain liaison with Group Chiefs of Artillery. They are ordered to co-operate freely, undertaking any mission that they can accomplish without interference with a mission assigned by higher authority. They are even authorized to set aside an assigned mission of their own responsibility. If they cannot do what is asked they may refer the matter up to another grouping. They are willing

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and anxious to do these things. They know their business, the powers and limitations of their guns. They attempt through officers and runners to keep in touch with the situation in divisions. At least one such Army Artillery liaison officer went "over the top" with the infantry on 1 November.

The field of application of long range guns is broad and deep. Their dispositions are the same. Liaison, either metallic or personal, is therefore difficult, especially laterally. The telephone usually works from front to rear and rear to front. For fugitive targets the army artillery cannot usually be depended upon unless fire is called for by aerial observers. Usually, however, timely fire can be brought upon stationary targets, such as concentrations, works, sensitive points, etc., by use of the telephone. Fire in close support of an advance cannot be made safe except by prearranged schedule, easy to draw up but sometimes requiring several hours work.

The Army Artillery cannot force its amicable attentions upon any corps but it offers its services, describes above its powers and limitations and bespeaks the good will of G-1's and the Military Police in order that its powerful assistance may be devoted to the support of the infantry.

The 8″ howitzer fires a 200 lb. projectile with an m.v. of 1525 f.s. to a range of 12,000 yards. In the firing position it weighs 19,100 lbs. There are three types of carriage on hand and a total of this calibre of 516 pieces. Its range is short for its calibre and it is very unweildy. While it will be necessary to employ it in case of a serious war, there are none now manned by any troops. It, the 9·2 and the 240$^{m/m}$ howitzer have been placed in reserve together with the less effective smaller calibres, the 60 pounders and the 6″guns. For any data on these you are referred to Ordnance Handbooks. They do not enter into your work here or at Leaverworth.

Considering the ammunition to be provided for these various types, we have:

For the 75$^{m/m}$ gun	H.E. Shell
	Shrapnel
	Smoke.
For the 155$^{m/m}$ How.	H.E. Shell
	Gas
	Smoke.
For the 155$^{m/m}$ gun	H.E. Shell

For all shell (H.E. or smoke) the super-quick fuze is provided in addition to those firing short delay.

For shrapnel a combination fuze is required.

These projectiles with appropriate fuzes may be classified as:

(1) Those for use against personnel.
(2) Those for use against material.
(3) Special shell. (Star and smoke are examples of special shells.)

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Against personnel we may use H.E. Shell with instantaneous or super-quick fuzes, gas shell or shrapnel.

Against materiel we generally employ H.E. shell with the short delay fuze. In some cases against inflammable materials, shrapnel or smoke shell may be used for incendiary effect.

There are limitations to the use of all these except the H.E. shell. To be effective shrapnel must be burst in the air and the fire must be observed. It cannot, therefore, be satisfactorily used at night or in fog, rain or snow or at ranges beyond the limit of observation.

For gas shell, winds must be favourable and the area shelled with any gas having appreciable persistence cannot be immediately occupied.

Smoke shell can be used under nearly all conditions but high wind makes it very expensive and difficult to maintain and it is in general superfluous under conditions of very low visibility.

As to the relative merits of shell and shrapnel, the future of the latter is not assured even though it has survived the war. The shrapnel is much less effective in howitzers than in guns, because the high angle of fall of the howitzer contracts the ground pattern of shrapnel very much. In guns firing at long range, the dispersion of the fuze becomes great and makes the effect unreliable; in addition, there is difficulty in making a time fuze of a time capacity adequate for long range firing. The shrapnel and its fuze are more difficult and costly to manufacture than the shell. The firing of shrapnel is limited practically to the day time and other conditions which permit the bursts to be observed. The technical conduct of shrapnel fire is much more difficult than that of shell; in fact is is questionable whether a hastily trained war officer can be expected to handle shrapnel effectively. While a well placed shrapnel is more effective against animate targets in the open than shell, dispersion causes a certain proportion of those fired to burst or graze with little effect. On the other hand, the new shell fuzes give bursts effective practically entirely above the ground, making their action not unlike that of shrapnel. These projectiles are independent of fuze dispersion and can be used effectively without observation. Thus simplicity of materiel, ammunition supply, training and firing, as well as considerations of production and general utility, point to the abandonment of the shrapel, which must justify itself in its greater effectiveness at least under certain conditions. The effectiveness of the shrapnel is none too firmly established, and it is possible that future investigations will result in its complete elimination. It is a fact that, whereas the light artillery carried habitually before the war about 25% shell and 75% shrapnel, the future proportions will be at least an equality of shell and shrapnel, with more probably a considerably predominating proportion of shell. Another factor to be considered is the fact that the neutralizing effect of shrapnel has been replaced largely by the special shells, gas and smoke.

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To quote from General Summerall's remarks during his conference with the Calibre Board:

"The French did not use shrapnel to any great extent with the 75 because they could not make satisfactory shrapnel. The Germans had developed a mechanical time fuze which they used at the beginning of the war but apparently that gave out. During the last three months of the war, the Boche used more shrapnel on us than through all the rest of the war, and the results they secured were heavy. They did not use it well, but its effect on us was very deadly for all that. We used it to a greater extent during the last part of the war. Towards the last we had one battery always using shrapnel."

The great disadvantage of shrapnel is that fire by it must be adjusted. This cannot be done at night, during bad weather. To properly adjust with shrapnel requires a better trained personnel which in time of war is a most difficult problem. The efficiency of well directed shrapnel against personnel in the open is far superior to shell. It has been estimated as being from 5 to 7 times as effective.

The following table gives the proportion of H.E. shell, shrapnel and smoke shell carried by the 75$^{m/m}$ gun batteries and the 155$^{m/m}$ howitzer:

75$^{m/m}$.	H.E Shell	50—75%
	Shrapnel	15—40%
	Smoke	10%
155$^{m/m}$ How.	H.E Shell	90%
	Smoke	10%

Special Shells.—The recent Disarmament Conference left the status of the use of gas in warfare uncertain. The discussion to-day and the consideration given the use of gas by artillery during the rest of this course is, of course, only applicable in case gas shells are retained. It is being taught at Leavenworth now, that they are only furnished to divisional types in special situations. At Edgewood Arsenal there are on hand two million gas shells for the 75 ready to fill and several hundred thousand already filled with mustard gas. There are also on hand seven hundred thousand gas shells for the 155$^{m/m}$ ready to fill. The present plans call for the complete assembly of gas shells at Edgewood Arsenal. Large quantities of mustard gas are on hand, as well as two years' supply of the world's production of phosphorous. During the war special shell bodies for gas shells and other form of chemical shell were in general not used. Bodies designed for a high explosive filler commonly were used. There was considerable difficulty during the war in designing a satisfactory container for the bursting charge used in chemical shell. This bursting charge is contained in what is commonly called a booster or gaine. It fits into an adapter which screws into the nose and to date considerable difficulty has been experienced in making the various joints gas tight. This leads in some cases to the gas leaking into the high explosive charge and causes duds. It also leads to leaky gas shells. Such leaky shells must be destroyed whenever discovered at dumps

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or in rear areas. At the front, of course, they can be fired. This difficulty will undoubtedly be solved in the future. In filling gas shells a void amounting to from six to fourteen per cent. of the total gas capacity of the shell must be left to take care of the expansion of the filler when heated by the discharge. In your course on the Tactics and Technique of Other Arms you will consider the Chemical Warfare Service as such and the use of gas from a command standpoint. To-day we merely wish to cover such phases of the use of gas shells as should be known as a basis for the technical consideration we will give it during the rest of this course.

Classification of Gas Shells.—Gases used as fillers in American shell may be classified as follows :—

Lethal (deadly)
Vesicant (burning the skin)
Irritant (affecting the nose, throat, and lungs, but not deadly)
Lachrymatory (tear gas)

Some gases may combine two or more of these properties. A more usual classification is based upon the rapidity of evaporation and from the artilleryman's point of view this is the normal classification. It divides gases into :

Non-persistent
Semi-persistent, and
Persistent.

I am not going to attempt a complete description of types of gases now on hand nor of the markings on gas shell, and so forth. In practical operations gas manuals will undoubtedly be published similar to those we had in France which will give all data concerning the nature of these gases, the marking of the shell and also very elaborate data as to the amount of gas it is necessary to deliver on any particular area to secure a particular effect. With the use of these tables, it becomes a purely mathematical calculation as to the number of rounds that should be fired upon an area and the rates of fire that should be used when complying with any orders for the use of gas.

In brief the characteristics of the three classifications mentioned are as follows :—

(a) Non-persistent.—The non-persistent gases volatilize without any special agency when the shell bursts, necessitating only a small bursting charge. A high initial concentration of the gas cloud is desired. This cloud can then drift downward and envelope the objective. Secondly, complete vaporization at the instant of burst is desired, but if the bursting charge is too strong, the liquid contents may scatter unduly and also in an upward direction, which is undesirable. Non-persistent gases boil at 20° C.

(b) Semi-persistent.—The semi-persistent gases boil from 20° to 200° C. In consequence, a heavier bursting charge is required for them than for non-persistent gases, in order that the explosion may

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atomize the shell's contents. The bursting charge must not be so strong as to unduly disturb the cloud formed or to cause a dis-association of the gas through excessive heat.

(c) Persistent.—With mustard gas the formation of an immediate cloud is not desired. With such shells the bursting charge should be such as to throw a coarse spray over a maximum area. A considerable bursting charge is necessary but its order of detonation should be lower than that for the two preceding classes. Persistent gases boil at a temperature above 200° C. and if complete vaporization is desired it is secured by an especially large bursting charge. The increased heat and pressure produce the effect desired. A mustard gas shell with a very large bursting charge is very much more deadly at the time of bursting but its persistency is also much less. Such a shell has recently been developed.

Amount and Kind of Gas Shell Fillers for Different Calibres.—The amounts and kinds of shell fillers used for the various calibres, of course, vary. We would expect to see the non-persistent types of gas used principally in the large calibres, because of the greater volume of gas delivered in a single burst. With such gases the rondentrations must be quickly built up. Inasmuch as the 155$^{m/m}$ gun and howitzer are the most numerous of the various types of medium calibres in our army, they may fire the bulk of the non-persistent gases. With persistent gases the concentration does not have to be so quickly biult up. Moreover, each 75$^{m/m}$ shell can gas 25 square yards effectively with mustard gas. It would therefore seem probable that the 75 will deliver a large part of such gas within the limits of their range. On the other hand, the large number of 75's which will presumably be present in any of our operations, will probably make it advisable to use them for firing a considerable amount of the other gases. Also, in many cases, it will be desirable to use persistent gases beyond the range of the 75's, and the heavier calibres must thus often fire persistent gases. It is therefore to be expected that all types of armament will be used for firing any one type of gas, and that any one type of armament will be used to fire all types of gases.

Fuzes for Gas Shells.—In firing gas shell, it is necessary to use a fuze which will burst the shell practically entirely above the ground. As we have seen before, this requires either that a time fuze or an instantaneous fuze be used or that ricochets be obtained when non-delay or short delay fuzes are to be used.

Handling Gas Shells.—In transporting and handling gas shell, the only danger to be expected is from leaky shells. All personnel handling gas shell should carry masks. In handling leaky shells, special clothing, especially gloves should be worn if the shells are filled with vesicant gas. All leaky shell must be fired at once or be destroyed.

Characteristics of Smoke Shell.—Smoke Shell are filled with

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either white phosphorous (WP) or titanium tetrachloride (FM). These two kinds of shell are used, respectively, for forming smoke screens and for the adjustment of gas shell fire. Either can be used for either purpose, but the WP shell is much superior for forming smoke screens and the FM shell for ranging; in fact the FM shell is only about 40% as efficient as the WP shell for screening purposes. When using FM shell for ranging, preceding a gas shoot, the necessary corrections must be made for the difference between shells when passing to fire for effect.

Use of Smoke Shells.—Smoke shell is used to form a smoke screen to blind the enemy. These screens may be used against observation posts, machine gun emplacements or even against the troops themselves. Smoke shells are also used to define the limits of an attack or raid, to draw fire and to divert attention from some other operation, or to stimulate gas attacks. Its use came more and more into favour during the World War. It was used, on occasion, in the near edge of our own rolling barrage to mark it clearly for our own troops, and to screen our troops from the observation of the enemy. Such use is apparently somewhat debatable. It reduces the number of guns firing shell and shrapnel and some claim that it furnished the enemy a definite point to aim on. The British artillery often put down smoke in a barrage just before it began to move forward in order to mark the line of the barrage and as a signal to the infantry that the movement of the barrage had begun. Smoke shell cannot be depended upon for much screening effect when fired in wind of much over twenty miles per hour. The amounts of smoke shell required to fire screens under various conditions are given in detail in your Artillery Notes. The figures there given were taken from the last data obtainable from the Chemical Warfare Service and are believed to be as nearly correct as any available to-day.

A study of these figures will show you that it is only under fairly favourable conditions that one can hope to effect much screening. On the other hand, favourable conditions, dull light, damp atmosphere, small wind, and so forth, are liable to be met with very frequently. The remarks concerning fuzes for gas shell are equally applicable to smoke shell. Smoke shell are normally carried by all division types.

Technical and Tactical Employment of Special Shell.—As we have stated above, the technical employment of special shell will be controlled by orders from division, corps and army commanders and not by the orders of artillery commanders. The following discussion of the tactics and use of special shell is taken from a paper by Lt.-Col. M. E. Locke, F.A.:

"Destructive fire is intended to produce casualties. Lethal gases are employed and as they are of low persistency the concentration must be quickly built up. This is secured for any given number of rounds by using as many guns as possible, firing simultaneously with a high rate of fire. The usual length of time is about two minutes,

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although under very favourable conditions, such as dead calm in thick woods or at night, fire may last for five minutes as a maximum.

"Neutralizing fire is intended to paralyze or greatly reduce human activity by wearing down morale and causing the mask to be worn for long periods of time. For this purpose recourse is generally had to persistent gases, preferably to mustard. This concentration does not have to be quickly built up. Fewer guns and a slower fire are admissible.

"For counter battery work a burst of lethal gas is often given followed by a slow neutralizing fire with persistent gas. If this latter fire has been kept up for three of four hours, it is well to 'top off' with another burst of toxic gas after the mask's effectiveness has been reduced by a long period of use.

"Harassing fire is usually effected with tear gas, which makes long continual wearing of the mask obligatory to escape its annoying effects. Interdiction fire with gas in substance means simply to fill a hostile area so full of mustard that the enemy cannot stay there. An example of this was the town of Armentieres in the attack of March 21, 1918, by the Germans. There are also a great many strategems that can be practised. Among them may be mentioned the mixing of lethal gas with a blinding smoke cloud, mixing gas with high explosive, the firing of a nauseating or coughing gas, causing the removal of the mask and following it with a burst of lethal gas, firing gas at night where men may be resting with masks off and possibly not near at hand, the mixing of a small amount of gas in our own rolling barrage, not enough to do real harm but enough to scare the enemy into putting on his mask. About one gun per battery (25%) can be so used. With a four mile per hour wind our troops can follow this barrage in one minute and without their masks. However, to sacrifice 25% of the guns in barrage for this artifice is open to debate. This by no means exhausts the list of devices to fire gas with increased damage to the enemy.

"In the offensive, gas may be used for the attack, during the attack, during lulls in the action and while consolidating a captured position. As previously stated, the offensive usually demands the use of non-persistent gases in areas over which our troops can be expected to advance within a short time. It is necessary in an offensive to calculate a safe interval as to time before the attacking troops arrive at successive stages of their advance when using semi-persistent gas. This calculation must be made both for the preliminary bombardment and for the attack. For support during consolidation use either semi-persistent or persistent gases. Choice as between the two involves an estimate at to the probable time elapsing before another advance. If it is probable that no further advance will be made for a number of days, use persistent gas, especially if dangerous counter attacks must be warded off.

"In defence or in retreat the use of persistent gas is the rule, mustard preferred. The area vacated must be made untenable as

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possible for the enemy and for the maximum length of time. Mustard surpasses all other gases for this purpose. This does not mean that gas is necessarily the best type of projectile to use. The effects of mustard are not immediately apparent and the hostile advance may be so rapid that casualties must be inflicted in the shortest space of time and in the greatest numbers. In such instances we must come back to shrapnel and high explosive shell, if the enemy wear masks. In any stabilized condition, such as obtained during the first three years of the World War, persistent gas can be freely used."

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R.A. DRAG HUNT.

COMPILED BY MAJOR M. H. DENDY, D.S.O., M.C., R.H.A.

It is thought that a few notes on the History of the Royal Artillery Drag Hunt may be of interest.

The Hunt was founded in 1866 by Captain A. H. W. Williams (General Sir A. H. Williams), who collected about £450 in the Woolwich Garrison for kennels, which were built at the top of the Common by the Remount Establishment.

A pack of about 15½ couples was got together by drafts from various packs of fox-hounds and this number has never much varied.

Mr. Thacker, the senior Veterinary Surgeon at Woolwich and afterwards the Principal Veterinary Surgeon in India, was appointed Master with Captain Williams as whipper in. Mr. Thacker, who had formerly been in the 10th Hussars, was a small spare man. His face was badly scarred from the falls he had had when riding young and vicious horses. Nearly every bone in his body had been broken, but his nerve was of iron and he was "hard to the backbone." He had a pony of about 15 hands, who could jump anything. He used to ride her over the chains on the Common and jump the "Ha Ha." He also kept a pet fox, whose kennel was used as the Drag. Since then this method has always been employed.

On the formation of the Hunt, most of the lines were in the immediate neighbourhood of Woolwich, the country then being comparatively free of garden cities and arterial roads. There were also a few lines in the direction of Sevenoaks.

In 1869 hounds were taken by invitation once a week into the Windsor District, where the Hunt had some excellent gallops. The first Windsor run was by invitation of the Household Brigade Drag Hunt (our senior by three years) from Skindles to Windsor. This was a zig-zag line of about six miles and the field numbered no less than 60, including many officers of the Household Brigade.

In 1871, hounds were first taken over the river into Essex and some new lines were also started in the old Surrey country.

In 1879 a serious calamity befell the Hunt, as dumb madness broke out during the summer and the whole pack had to be destroyed.

For the following season a new pack was formed by drafts, mostly from Lord Tredegar's Cumberland Hunt, but this was again broken up on the death of the Master, Major Ward-Ashton, in March, 1880.

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Lord Stamfordham, then Lieut. Arthur Bigge, R.H.A., one of Major Ward-Ashton's subalterns in the Riding Troop writes "I have known many Masters of the Drag, but I cannot imagine anyone who could have worked harder or thrown himself more thoroughly into the business than did my dear old Commanding Officer and friend. He filled the office until his death in 1880, and some attribute his fatal illness to his insisting on walking a line when he was far from well."

The Hunt was not started again then because at a meeting of the members it was considered that buildings and wire would make it impossible to continue.

This, fortunately for the officers stationed at Woolwich, has proved an erroneous decision as in spite of 40 further years of building and wiring the Hunt still flourishes.

For an interval of about three years the kennels stood empty; but in 1883, another pack was got together with Major Hickman as Master. After one season's hunting dumb madness again destroyed the pack in the spring of 1884.

After this second outbreak of madness the kennels were moved from the top of the common to their present position near the Veterinary Hospital. In 1887, there were lines about Bromley, Westerham, Sevenoaks, Farningham and occasionally in Essex in addition to those in the neighbourhood of Woolwich. During this season the Drag had one hunt after a stray stag and incidentally two hounds were killed by a train during the hunt.

In 1898, the most distant meet reached by road was Farningham. The Hunt went by train to Westerham in Kent, and to Romford and Upminster in Essex.

In 1903 Captain Powell instituted breeding from the hounds of the Pack, which proved successful and has been carried on. The difficulty of obtaining walks for the puppies has always been overcome by the kindness of officers of the garrison and people living in the district.

About 1911, the Pack was kept up to strength entirely by breeding and by buying unentered puppies; but at present the price of the latter is too great for the means of the Hunt. The majority of sportsmen think that any hound is good enough for a Drag Hunt, but anyone who has been a Hunt servant to such a pack, will agree that babblers, skirters, and jealous hounds are as harmful to a good pack of drag hounds as to a pack of fox hounds. Probably the only permissible fault is that of not "drawing."

In 1906, Captain Harry Rochfort-Boyd, who had the hounds for three seasons, altered the method of the Hunt. Instead of there being two fast gallops with one check, he had longer lines with a considerable number of checks to try to make the lines as much like a fox hunt as possible and also to allow officers mounted on slow horses a fair chance of seeing the hounds. This method has been carried on ever since.

Captain Rochfort-Boyd also commenced hunting three days a week instead of two, but these had to be reduced to five days a fortnight in the autumn of 1912. Close meets became fewer and fewer

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and the long hacks three days a week were too much for one pack of hounds.

About this time training to meets in Kent had to be abandoned owing to the increased charges made by the S.E. & C. Railway; but a larger number of lines were run in Essex, where the London and Southend Railway were always most obliging.

From 1906 until 1914 hounds were taken by road to all meets in Kent, the longest hack being to Ash, about 17 miles and home from Ridley,, about 18 miles. In Essex hounds went by road as far as Romford, but for all other meets by road to Barking and thence by train. The farthest line in Essex was at Laindon.

In 1915 food restrictions during the great war necessitated the destruction of the entire pack of hounds. As soon as the war was over every effort was made to get the pack restarted and in 1920, after a lapse of six years the Hunt was again in being, greatly due to the energy of the Master, Captain Huttenbach. Getting a pack together was a very difficult task, as hounds were scarce and prices prohibitive. Every "legitimate" hunt in Great Britain wanted hounds to rebuild their packs, with the result that the Drag Hunt had to take what they could get. By 1921 there were 14½ couples of useful hounds in kennel. During the last two seasons Captain Jackson, the Master, has by unremitting care and hard work, worked up the pack so that it is now probably the best pack of hounds that has ever belonged to the R.A. Drag Hunt. He has also greatly improved the kennels by enclosing another piece of ground to form a paddock and four bitch yards.

At the present time there are 19½ couples of hounds in kennel and six couples of puppies in from walk.

The Drag Hunt now hunts two days a week. Lines in the immediate neighbourhood of Woolwich are very few and unfortunately becoming fewer owing to building and the latest forms of impediment, sports grounds and arterial roads. Lines in Essex are limited to the country about Upminster, Romford and Havering, owing to railway fares being prohibitive, while those about Dunton Green, Shoreham, Farningham and Ash are probably much the same as have been hunted over for very many years.

The increase in the work of a soldier makes it more difficult for the present day Master to devote so much of his time to walking lines, visiting farmers and taking hounds out to the meets, but this is counteracted by the motor. Where in the old days the Master's only means of conveyance was the Drag trap, he must now have a car and this turns what was then the work of a whole day into that of an afternoon. Hounds are taken to all meets further than Chiselhurst in a motor van hired from the R.A. Canteen.

A soldier's pack must necessarily know a constant supply of fresh Masters. The Hunt is now losing its present Master, Captain Jackson, who after two years of hard work has the satisfaction of knowing that he is handing over the Hunt going as strong as it ever has in the past. This was made clear at the opening meet this season when the field numbered 101 which is believed to be a record.

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The following is as accurate a list of Masters of the R.A. Drag Hunt as the writer can obtain :—

1866	...	Mr. Thacker.
1867	...	Capt. A. H. W. Williams.
1868-70	...	Capt. S. P. Lynes.
1871	...	Lieut. H. A. T. Custance.
1872	...	Capt. F. A. Winyates.
1873	...	Capt. A. E. Turner.
1874	...	Lieut. F. A. Yorke (1st time).
1875	...	Capt. R. Alexander.
1876	...	Major Hale Young Wortham.
1877-80	...	Major E. J. Ward-Ashton.
1881	...	No Hunt.
1882	...	No Hunt.
1883	...	Major S. C. Hickman.
1884	...	Lieut. The Hon. F. E. Allsopp.
1885	...	Capt. A. E. Russell.
1886	...	Capt. W. A. G. Saunders.
1887	...	Capt. H. B. Jeffreys.
1888	...	Capt. H. E. W. De Robeck.
1889	...	Lieut. C. H. S. Vores.
1890	...	Lieut. J. J. MacMahon.
1891	...	Lieut. C. G. Mackenzie.
1892-95	...	Major F. A. Yorke (2nd time).
1895-96	...	Lieut. E. W. M. Powell.
1896-97	...	Capt. W. L. H. Paget.
1897-98	...	Capt. F. D. V. Wing.
1898-99	...	Capt. J. Hanwell.
1900	...	Major J. W. Dunlop & Capt. H. D. De Pree.
1901	...	Capt. C. D. Balfour.
1902	...	Capt. H. Ramsden.
1903	...	Capt. E. W. M. Powell.
1904	...	Major D. Arbuthnot.
1905	...	Lieut. C. G. Mayall.
1906-08	...	Capt. H. C. Rochfort-Boyd.
1909-10	...	Capt. C. A. R. Scott.
1911	...	Capt. C. A. R. Scott & Lieut. M. H. Dendy.
1912-14	...	Lieut. E. L. Talbot.
1920	...	Capt. N. H. Huttenbach.
1921	...	Lieut. G. W. Heath & Lieut. H. G. Morrison.
1922-23	...	Capt. E. H. P. Jackson.

Unfortunately no record has been kept of the whippers-in.

No article on the Hunt would be complete without mentioning the names of some of its servants.

The present kennelman, Bombardier T. Homewood, R.H.A., took up his duties in 1902, and except when engaged on more serious work from 1914 to 1918, has not missed a day.

The names of Gunners Grainger and Guest are bye-words for two-legged foxes. Both of these runners officiated for many years. Guest had a motor cycle and a side car in the early days of these

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horrible "combinations." In this the Master went out to walk lines and at times felt that the days, on which the drag hunted, were a happy relief from danger.

Since 1866, when the Hunt was first formed, the landowners and farmers have always given the Hunt every assistance and a hearty welcome. Many of them who come to the annual dinner held at the Mess in their honour, have been associated with the R.A. Drag Hunt for about a quarter of a century. As an example of a sporting farmer, the following incident is worth recording:—The Master had carefully avoided a field of wheat, which necessitated a check and a short hack down a lane. At the meet the owner of the field came up and said "You are not riding over that wheat of mine." The Master assured the Farmer that no one would ride on the field, whereupon the latter said "The Foxhounds rode over it on Thursday and did no harm so you have got to ride over it to-day"; with which he jumped on to his pony and put the runner right across the middle of the wheat field.

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R.A. DRAG HUNT—WOOLWICH, 1869.

Staff Vet. Surg. Thacker (Master). H. W. Browne. Capt. F. A. Whinyates. Lt. G. Turnbull. Miss Larkins. Lt. Annesley. G. B. B. Hobart
Capt. S. P. Lynes. J. R. Bramley Capt. A. H. Williams. Capt. E. H. Thurlow.
Capt. H. Thornhill. Capt. F. Lyon. H. Kingscote.

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SOME NOTES ON EPICYCLIC TRANSMISSION.

By MAJOR N. HUDSON, D.S.O., R.A.

(1) It is hoped that a few notes on one of the salient features of tank transmission and control may be of interest to readers who are following the progress of cross country vehicles in the Service.

The marked advance in design from the Mark IV to the Mark V Tank is well known; the improvement was largely due to the introduction of the epicyclic gear in the latter tank. This gear may be simply described as a device which included the functions of a reduction gear and clutch, or the steering, starting and stopping arrangement in one.

Although the principle of epicyclic trains, or gears, is of some antiquity, having been originally evolved from the study of astronomy, there are some who are not acquainted with the methods of estimating the speed variations effected, and it is with the object of explaining these simple calculations, that some notes have been compiled, for which no originality is claimed.

(2) The epicyclic train is a term used to denote a series of two or more wheels (usually toothed) carried by an arm or cage; the wheels having certain rotations relative to the arm, which itself rotates.

This definition is important and has four interesting corollaries, viz. :—

(a) If any one of the wheels carried by the arm be prevented from revolving relative to the arm, the train ceases to be epicyclic. In this case all the wheels and the arm become locked rigidly together, and the whole system revolves *en bloc*, and no relative movement of the components occurs. (This is top gear.)

(b) If one of the wheels is prevented from revolving, power will be transmitted at a velocity which bears a fixed ratio to the diameters (or number of teeth) of the wheels which form the train. (This is normally the reduction gear.)

(c) If neither the arm nor any of the wheels of the train be held and prevented from revolving, no power can be transmitted nor will any definite ratio of movement between the components result. (This forms the neutral position.)

(d) If the arm or cage be prevented from revolving, the train ceases to be epicyclic. It then becomes an ordinary train of wheels whose angular velocities are in the inverse ratio of their respective diameters.

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It is only proposed to describe the epicyclic trains comprising two or three wheels and an arm, for although more complex systems are to be found, they are only amplifications of the above and have not yet been adopted in the Service.

(3) The two types of epicyclic trains which it is proposed to discuss are those with two wheels and an arm, and those with three wheels and an arm.

The former help to show the method of calculation, and the latter are interesting as actual examples of tank transmission design.

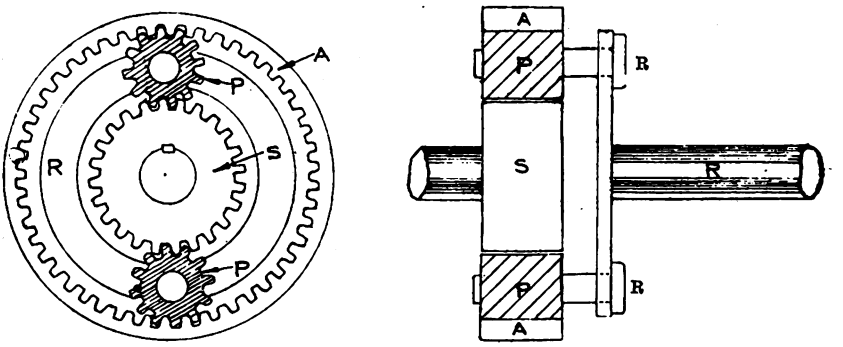

FIG. 1.

(4) The notation throughout is the same and is as follows. (See Fig. 1.)

R is the arm, or planet cage.
S is the diameter or number of teeth of the Sun wheel, or wheel concentric with R.
P is the diameter or number of teeth of the planet wheel, or wheel meshing with S and A.
A is the diameter or number of teeth of the annulus, or internally toothed wheel.

The fixed wheel in each example is shaded thus :—

As regards the planet pinions there may be any number connecting the sun and annulus wheels, in a certain tank for instance there are three, but this number does not in any way affect the gear reductions.

It will be observed that the diameters of the three wheels, annulus, planet and sun, are connected by the fact that the diameter (or number of teeth) of the annulus must equal the diameter (or number of teeth) of the sun wheel plus twice that of the planet, or in formula form :—

$$A = S + 2P.$$

In the following diagrams only one planet wheel is shown for the sake of clearness, and a cage which carries the planet wheel bearings is shown by a straight line, or arm.

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(5) *(Two wheel epicyclics.)* Fig 2.

Fig. 2 shows a simple gear consisting of an arm R and two wheels S and P. S is fixed and concentric with R. It is similar in principle to a portion of the Ford car epicyclic gear where the planet pinions are carried on pins projecting from the face of the fly wheel. R is rotated and carries P with it around S. So R drives, P is

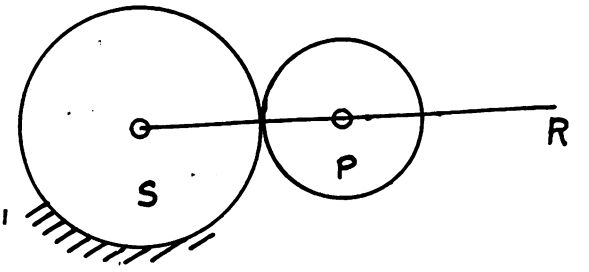

FIG. 2.

driven and S is fixed.

To find how many times P will revolve for every revolution of R (the method applies to all the remaining calculations).

Imagine all the wheels to be locked to the arm, and turn the whole system once completely round in a clockwise (or positive) direction. Then turn the fixed wheel back again one complete turn in an anti-clockwise (or negative) direction. Note the effect on the remaining components of the gear, of turning S back again, and tabulate the results as under.

	S	P	R
1 Turn clockwise. All parts locked	$+1$	$+1$	$+1$
1 Turn anti-clockwise of the Sun wheel	-1	$+\frac{S}{P}$	0
Add and get the result ...	0	$1+\frac{S}{P}$	1

So when R turns once, P has turned $1+\frac{S}{P}$ times.

Example:—S has 28 teeth and P has 7.

Then for every turn of R the arm, P has revolved $1+\frac{S}{P}$ or $1+\frac{28}{7}$ or 5 times.

The explanation for this seemingly curious result is that the planet wheel turns round once on its way round the wheel S, in addition to the turns it makes by meshing with S.

Our next example (Fig. 3) is of an internally toothed wheel or Annulus A, meshing with a planet wheel P which is fixed and cannot rotate. An arm R pivoted at P's centre carries the centre of A around P. So R drives, A is driven, and P is fixed.

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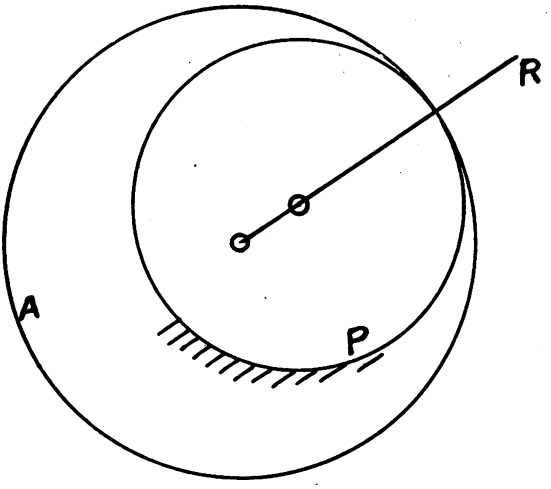

FIG. 3.

As before, imagining the two wheels locked to R, we rotate the whole system one complete turn in a clockwise direction, and then turn the fixed wheel P back one turn in an anti-clockwise direction and tabulate results :—

	P	A	R
All parts locked	+1	+1	+1
Planet turned back again	-1	$-\frac{P}{A}$	0
Result	0	$1-\frac{P}{A}$	1

So for every turn R makes, A makes $1 - \frac{P}{A}$ turns.

Example :—The Annulus has 51 teeth and the Planet 17.

Then for every turn of R, A turns

$$1-\frac{P}{A} \text{ or } 1-\frac{17}{51} \text{ or } 1-\frac{1}{3} \text{ or two-thirds of a turn.}$$

This device is used in textile machinery.

In both of the above examples, if R be fixed, the wheels are simple gears and not epicyclics; giving speed ratios of $\frac{S}{P}$ and $\frac{P}{A}$ respectively, and if either of the wheels were locked to R the whole would go round solid, and not be a gear at all.

(6) *Three wheel epicyclics* :—

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We now come to the three wheel and an arm type which is used in tanks.

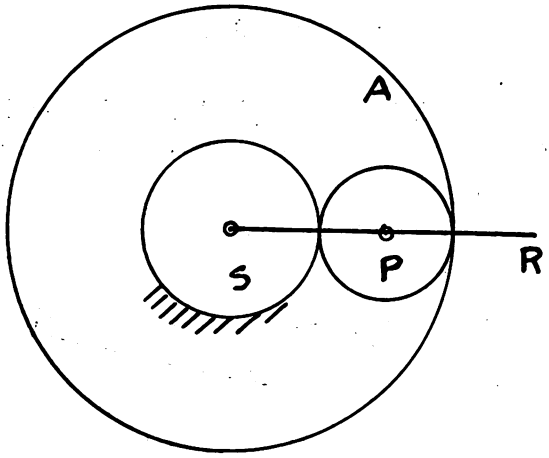

FIG. 4.

In Fig. 4 we have S fixed, and R rotating about its centre, P meshing with both S and A.

Here A drives, R is driven, and S is fixed.

As before, imagine all wheels locked to R, and give the whole system one clockwise turn. Then turn the fixed wheel S one turn back again anti-clockwise, and tabulate results.

	S	P	A	R
All wheels locked	+1	+1	+1	+1
S turned back again ...	-1	$+\frac{S}{P}$	$+\frac{S}{P}\cdot\frac{P}{A}$	0
Result	0	$1+\frac{S}{P}$	$1+\frac{S}{A}$	1

So for every turn of R, P has turned $1+\frac{S}{P}$ times and A has turned $1+\frac{S}{A}$ times. And in the Mark V tank where A=51, S=21, P=15 for every turn of R, P has turned $1+\frac{S}{P}$ times $=1+\frac{21}{15}$ times, and A has turned $\frac{A+S}{A}=\frac{51+21}{51}=\frac{72}{51}=1{\cdot}41$ times which gives us the reduction ratio.

We have already observed that A=S+2 P so the formula $1+\frac{S}{A}$ or $\frac{A+S}{A}$, which is in terms of S and A, may be written :—

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$\frac{2\ (P+S)}{2\ P+S}$ in terms of P & S or

$\frac{2\ (A-P)}{A}$ in terms of A & P

by substitution.

In this gear S is held by a band brake, which is used as the clutch in releasing or taking up the drive from A to R.

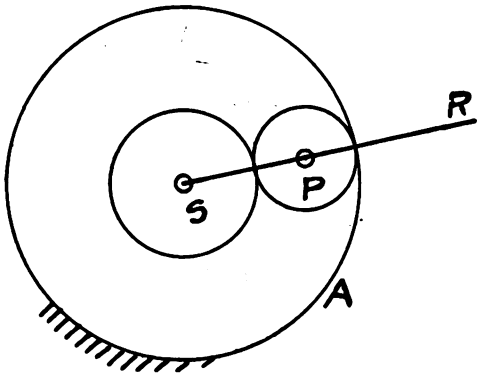

Fig. 5.

Turning to Fig. 5 we have the same gear as in the preceding figure, but different conditions. Here S drives, R is driven, and A is fixed.

Tabulating as before we get :—

	A	P	S	R
All wheels locked	+1	+1	+1	+1
A turned back	-1	$-\frac{A}{P}$	$+\frac{A}{P}\cdot\frac{P}{S}$	0
	0	$1-\frac{A}{P}$	$1+\frac{A}{S}$	1

so for every turn of R, P turns $1-\frac{A}{P}$ times and S turns $1+\frac{A}{S}$ times.

In the Mark V Tank where A = 51, S = 21, P = 15, if we drove S and connected R to the chain sprocket, we should have a speed reduction of $1+\frac{A}{S}$ or $1+\frac{51}{21}$ or 3·43 to 1.

In this gear A would be held by a band brake to act as the clutch in releasing and taking up the drive from S to R. Fig. 6.

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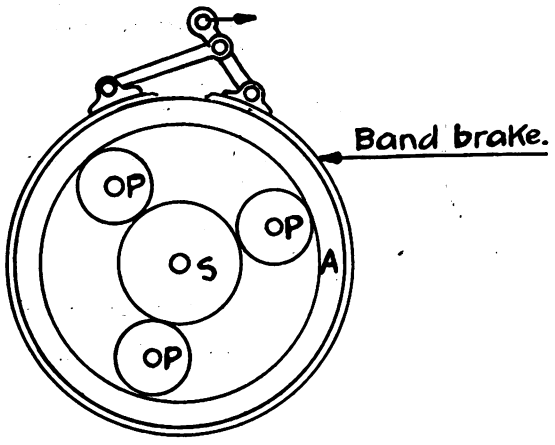

FIG. 6.

As regards design, it is interesting to note that it is impossible to obtain a reduction as high as 2 to 1 in the arrangement shown in Fig. 4, or as low as 2 to 1 in that in Fig. 5. This explains why it is necessary to select the arrangement to suit the reduction requirements.

The reason is simply explained. In Fig 4 the reduction is $1+\frac{S}{A}$ and in Fig. 5 it is $1+\frac{A}{S}$, now if either of these are equated to 2, we have S=A, which is clearly impossible. But if, for example, we put $1+\frac{S}{A}=1\frac{1}{2}$ (Fig. 4) and $1+\frac{A}{S}=3$ (Fig. 5) we obtain the result 2 S=A, which is quite feasible, and entails the conditions A=2 S =4 P.

In a modern tank the conditions are as in Fig. 5, here A=69, S=33, P=18, and the reduction $1+\frac{A}{S}=3{\cdot}09$ to 1.

A two-speed change is included, which is effected by connecting A to S by a plate clutch, so that in top speed the whole system revolves *en bloc*.

For steering in low speed, the band brake surrounding A is used, and the plate clutch is released; and in top speed the plate clutch connecting A and S is used, and the band brake surrounding A is released.

Fig. 7 gives a line diagram of the arrangement.

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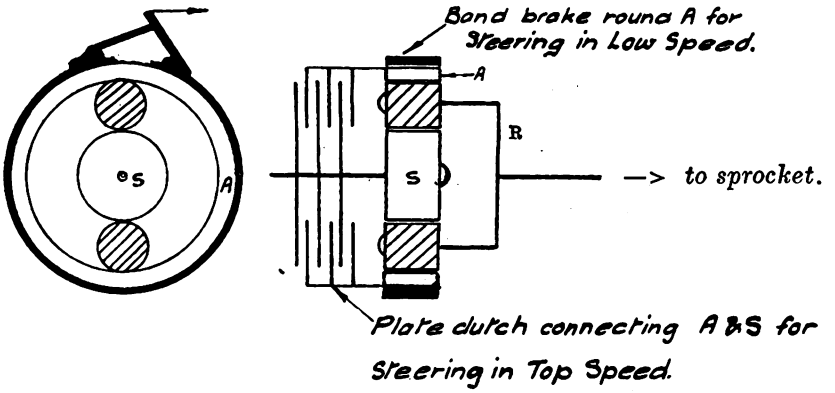

FIG. 7.

(7) Fig. 8 represents the gear in common use in an ordinary capstan, which at first sight looks like an epicyclic gear, but this is not the case.

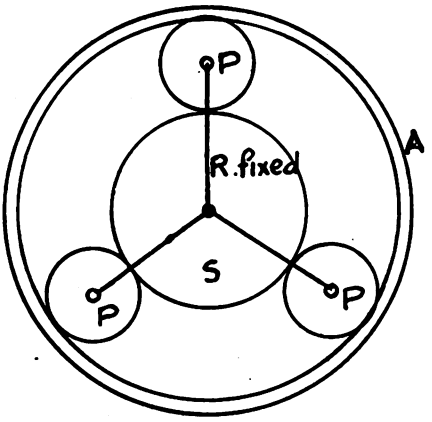

FIG. 8.

Here S drives and A is driven, but R is fixed, and P merely transmits the reversed motion of S to A, at a reduction of $\frac{A}{S}$.

The foregoing illustrates all the types of epicyclic gears likely to be found in the service. As mentioned before, further amplifications are possible, and have actually been used in certain experimental machines, but it is thought that considerations of mechanical efficiency, bulk, weight, and cost; will preclude any further advance in this direction for some time to come.

Finally it is suggested that an interesting evening may be spent in cutting out the various wheels in cardboard and verifying the formulæ.

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R.F.A. (T.)—SOME DIFFICULTIES AND SUGGESTIONS.

By LIEUT. H. L. G. BURLTON, M.C., R.F.A.

Introduction.

SOME very interesting and valuable suggestions were outlined in Captain Frith's article in the April number on the difficulties and desires of the Field Artillery of our Territorial Army.

No one will deny the great importance of the Territorial movement to the nation and the Empire generally, especially under the circumstances of the present day, and the writer is therefore encouraged to elaborate some of the suggestions referred to above in the hope that a brief examination of detail will point the way to improvements in method sufficiently valuable to be worthy of consideration.

I. Liaison with the Regulars.

At first glance Captain Frith's suggestion that regular brigades should "adopt" territorial brigades seems an impossible proposition. There are 15 regular R.F.A. brigades stationed in England, Scotland, and Wales, of which one, the Larkhill brigade, is too fully occupied with its ordinary duties to extend these in any way. There are also 58 territorial brigades to consider. Fourteen into 58 won't go: but certain hazy recollections of school mathematics remind one that juggling with figures will often produce the required answer. If we therefore examine the mystic figure 58 in its relation to territorial brigades we find that seven of these brigades consist of two batteries each and that therefore some of them can be paired to suit our purpose. Consequently if we group four of these brigades—viz., the 93rd (E. Lancs—Blackburn) with the 106th (Lancs Yeomanry—Liverpool), and the 103rd (Suffolk—Ipswich) with the 104th (Essex Yeomanry—Chelmsford) (with due apologies to the "Nth (Blankshire Yeomanry) Brigade, R.F.A."!)—we reduce our total to 56 brigades or brigade groups. This would involve each of the 14 regular brigades "adopting" four territorial brigades.

The next question to be considered is, is this an impossibly large "family"? The answer to this question is best obtained by examining the limited opportunities a territorial brigade gets, or can make, to do training other than evening drills, training in which the "godparent" could help.

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(a) Annual Training.

The suggestion that each regular brigade should be "host" to its affiliated (T) brigade would hardly work in this case. No regular brigade could compete with the exigencies of its own practice camp and then horse and actively assist in the training of any or all of its "godchildren." The most that could be done, or that any territorial would hope for, would be the provision of a small cadre of selected officer and N.C.O. specialist instructors to assist each of the affiliated (T) brigades. Under various circumstances even this might be beyond the capabilities of the "godparent."

(b) "Week End" Camps.

These are invaluable training opportunities to territorial brigades. They are normally held at Easter and Whitsun, on both of which occasions it is possible to work in $2\frac{1}{2}$ days intensive training, clear of travelling and all necessary preliminary preparations, etc. This time seems absurdly short but in reality it has been proved to be worth several weeks of the ordinary evening drills, and it is suggested that it could be made even more valuable by the regular brigades co-operating as follows :—

Suppose "A" Regular Brigade, R.F.A., has "adopted" "W", "X", "Y" and "Z" Territorial Brigades.

At Easter.—"A" Brigade receives "W" (T) Brigade in its barracks, places its horses, guns, etc., and miniature range at their disposal and takes an active and practical interest in their training.

At the same time "X" (T) Brigade holds a camp in its own area and "A" Brigade sends a few selected officers and N.C.O's to assist in the training and instruction.

At Whitsun.—"A" Brigade entertains "Y" (T) Brigade and assists "Z" (T) Brigade, as above.

In the following year there would be a general change round for the territorial brigades.

(c) Attachments.

Captain Frith emphasised the value of allowing territorial affiliated brigades to arrange attachments direct with their "godparent." Territorial officers can occasionally get away from business for a week, where the official "12 to 24 days" would be impossible : similarly territorial N.C.O's, signallers, etc., particularly with the prevalent unemployment, could frequently fit in a few slack days with the regular brigade, with undoubted advantage to themselves and little or no extra effort for the "godparent."

(d) Sports.

Lastly, much could be done to foster the proposed liaison in the realm of sport, by holding, within the "family," inter-brigade football and boxing competitions and organised sports. It is not suggested that the regular brigade should always act as host. In fact it would

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be distinctly desirable for each brigade to take it in turns to make the necessary arrangements, and such fixtures held locally would prove valuable recruiting attractions for the territorial "host" brigade.

II. Permanent Staff Instructors.

A "dud" permanent staff instructor is worse than useless: he is positively harmful.

A few simple figures may illustrate the degree of dispersion which is such a grave handicap to the average territorial brigade. Excluding the fifteen fortunate (T) brigades whose H.Q. and batteries are all adjacent, the average distance between brigade H.Q. and the H.Q. of each of its four batteries is over 16 miles. As there is normally one battery (sometimes more) actually with the (T) brigade H.Q., this average increases to over 22 miles for each of the other three batteries. Finally, to quote extremes, there are 16 cases of batteries over 50 miles from their brigade H.Q. of which 6 are over 70 miles away.

Unalterable circumstances therefore place the majority of permanent staff instructors very much on their own. Their duties require great tact, patience and initiative. They must be up-to-date and efficient instructors in gun drill, riding and driving, care of equipment, manœuvre, elementary gunnery and miniature range work, signalling and battery staff duties, and the Lewis gun. In short, they must be picked, *all-round* men who have graduated successfully in some special course appropriate to these requirements. Further the appointment should be made sufficiently attractive to appeal to the ambitious N.C.O.

Here again the "godparent" brigade could assist with short "refresher" courses for the permanent staff during the slack winter period.

III.—Horses.

A constant and one of the greatest difficulties of the territorial F.A. brigade is the provision of horses for use during the training season and also at annual training.

For the training season, the present system consists of contracting locally for from 12 to 20 horses to be provided each evening on which there is a mounted parade. This number seems small but is normally sufficient. The trouble however lies with the stamp of horse provided.

Any old "weed" seems to do, and the trouble goes deeper still. Each evening a fresh selection of "weeds" arrives, with the obvious result that the unfortunate territorial never gets the opportunity to train with other than unsuitable, untrained, and untrainable horses.

Some county associations keep their own horses: others make the necessary general contract and leave the details to the battery commander: others virtually hand the whole affair over to the battery commander—who promptly overspends his grant with the result that everybody suffers in the future.

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The best that can be said of this system is that, with the maximum of endeavour and mutual good will, it *can* be made to work. But the results achieved are bound to fluctuate according to local variations and the resulting standard of efficiency, even within the Brigade, is unnecessarily uneven.

Annual training is the one outstanding event of the territorial year. It is more so than the regular brigade's practice camp. It is the only real opportunity given the territorial battery in which to attempt to become efficient, to really try to be soldiers—and they do try, too. It is the climax of their yearly training. It is also the climax of the horse question.

"Boarding-in," classifying, issuing, sorting, teaming, harness-fitting, testing . . . . chaos . . . . Reteaming, refitting, retesting . . . . chaos . . . . Whole days of ceaseless struggle between half trained man and untrained beast. Truly an auspicious opening and a congenial atmosphere for the impressionable amateur who has come to master the rudiments of a spare time hobby, a hobby of national importance. "Unstinted admiration" at the way the job is tackled and "pure blasphemy" at the needless waste of all important time are the only appropriate feelings possible.

The writer feels strongly that there must be some method of solving this vital question with a greater degree of success than is offered by the variations of the present system. Why should a spare time soldier be expected to learn under every possible disadvantage where his professional brother, the regular recruit, learns to ride and drive on horses that have probably forgotten as much of the game as he is ever likely to know? With all modesty it is suggested that this is essentially a case for centralisation: that some central body, such as the remount department, should undertake the *permanent* provision of suitable horses for the annual training camps of the territorials and that these same horses should be "boarded out" during the remainder of the year with territorial F.A. brigades for use in training personnel as required.

Normally a territorial brigade does practice camp (gunnery) every other year, arranging its own camp locally or at any convenient locality in intermediate years. Working on the 1923 basis, it will be found that Larkhill, West Down, Okehampton, Trawsfynydd, Redesdale and Buddon averaged nearly 5 (T) brigades each, or half the total number (58). By selecting another six camp sites (preferably permanent), arrangements could be made for the remaining (T) brigades not attending gunnery practice camps. In other words horses would be required for twelve camps, at each of which there would be one territorial brigade at a time, each camp therefore extending, as far as the territorials were concerned, over a period of 75 days, excluding advance and rear parties and similar arrangements. The provision of 250 horses per camp would be ample. These would be available in turn for each of the five (T) brigades attending that camp and, at its conclusion, each of these five (T) brigades would

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receive 50 of these horses to distribute amongst the batteries for training purposes and maintenance by them until the following year's camp period commenced.

In other words, every territorial battery would have its own horses, which would soon become well trained, for use in drills throughout the year, and would use similarly trained, suitable horses during annual training. The writer firmly believes that the standard of the F.A. brigade in the Territorial Army would be materially improved in a very short time under some such system. Further, in the event of mobilisation, trained horses would be available for the immediate mobilisation of a division of artillery and an Army Brigade complete.

Before dismissing this subject two factors require consideration.

(a) *Finance.*—Would the cost of provision and maintenance of the 3000 horses required be prohibitive? The initial cost would obviously be considerably larger than the present annual horse grant to county associations, but would this not be a good investment in view of the annual saving that would be effected in subsequent years? The fact that certain county associations keep their own horses, irrespective of local facilities for hiring, appears to be decidedly relevant. In any case, most county associations would probably gladly arrange for the stabling and the payment of the necessary personnel required for grooming, etc., and saving might easily be effected by hiring these horses to approved local tradesmen, etc., during some of the hours they are not required for drills and training.

(b) *Mechanicalisation.*—If this is to be universally extended to the Territorial Army, the above proposal must obviously lapse. However in this case the financial considerations involved must be even more potent. If adopted but confined to the regulars, the horses thereby displaced could be absorbed by the territorials on the lines suggested above.

Conclusion.

It is not claimed that these suggestions are ideal. They may not even be feasible. It is, however, hoped that they will merit criticism, which, if constructive, will tend to the same object, namely the improved efficiency of the territorial branch of our Royal Regiment of Artillery.

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AN EXPERIMENT IN TRAINING.

By LIEUTENANT K. W. MAURICE-JONES, D.S.O., R.A.
Captain, 1/King's African Rifles.

I PROPOSE in this article to describe how a company of native Infantry of the King's African Rifles from Nyasaland was converted into a fully trained and efficient company of the Somaliland Camel Corps which constitutes the military force of the Somaliland Protectorate. A brief outline of the circumstances which necessitated the transference of this company from its home near Lake Nyasa to the sand-strewn region of Somaliland must however, first occupy our attention. In 1922, the government in the Protectorate was faced with a difficult situation. The imposition of a poll-tax on the local inhabitants had been strongly resented by them, and the opposition to the new tax had led to an open and armed resistance to an attempt to collect it by force, and to the murder of a District Commissioner.

An armed revolt was not however the only difficulty with which the military authorities of the Protectorate were confronted: the situation was complicated by a further problem. It had always been considered necessary to have a foreign contingent in the Camel Corps, and that at least one company should consist of other natives than Somalis. Up to 1922, this contingent had been formed of Punjabi Mussalman sepoys, seconded from their Indian regiments for varying periods, but the secondment of the Indian Contingent was drawing to a close, and that year the Sepoys were due back in India where they would rejoin their own regiments. For economical and other reasons it had been decided not to enroll another Indian Contingent, but the necessity of a foreign element in the Camel Corps was still realised. Where was this element to come from?

A conference of the higher authorities concerned was held at the Colonial Office to discuss this question, with the result that a request was sent to the Government of Nyasaland to despatch to Somaliland a Yao Company of the 1st King's African Rifles.

The Yaos are a large tribe of Central African Bantu negroes who live between the lower Zambezi and the Rovuma Rivers to the east and south of Lake Nyasa. Previous to the British occupation of Nyasaland, they were best known for slave-raiding which they carried out in conjunction with the coastal Arabs to whom they sold the slaves after a successful expedition, but they have since gained considerable renown as good soldiers. Ashantee, Somaliland, Jubaland, and German East Africa have all added to their fame.

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Physically, the Yao is short and stocky and of great muscular strength. By nature, he is a child, happy as the day is long, and the easiest person in the world to get on with. Intellectually, he possesses the normal amount of intelligence shown by other savage negro tribes, but is extremely adaptable and will learn readily if enough trouble is taken with his instruction.

The 1st King's African Rifles is the garrison of Nyasaland and is recruited purely from the natives of that country. The battalion consists of two companies, one of which is formed of Yaos and the

A Private 1/K.A. Rifles.

other of Angoni and Atonga, each company being about 200 strong. In August, 1922, the Nyasaland government was asked to dispatch 140 Yao rank and file with three officers to Somaliland, the contingent to serve in that country for three years and in the meantime to be attached

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to the Somaliland Camel Corps, and the request was immediately complied with. The Commanding Officer of the 1st King's African Rifles was instructed to supply the contingent without delay. Volunteers were called for from the Yao company, and every man offered his services, so that a selection had to be made from a crowd of eager aspirants to foreign service. The successful volunteers were formed into a new company called "G" Company, and the men were sent to their villages for a month's leave pending their departure from Nyasaland.

On the 1st October they reported back from leave, and the next couple of days were spent in getting them equipped and prepared for the journey to Somaliland. On the 3rd October, the company was inspected by His Excellency the Governor of Nyasaland, and next morning, at dawn, we marched out on the first stage of the journey, the 40 miles to Limbe, the nearest rail-head.

The strength of the Company when we left Nyasaland was 3 British Officers, 141 native rank and file, and 2 native followers, the rank and file consisting of 17 machine-gunners, 15 Lewis gunners, 9 Stokes-gunners, 7 signallers, 5 buglers and 88 riflemen; the followers of one hospital dresser and one interpreter. Each man was allowed to take one wife and one child in arms, so that, as we had only four bachelors in the company, we were altogether a party of over 300 natives. The men themselves were excellent material, about 95 per cent. having seen active service against the Germans in East Africa. The majority were 1917 recruits, though there was the usual sprinkling of old soldiers, in fact three of these had served previously in Somaliland in the operations against the "Mad Mullah" in 1900-04.

We left Limbe by the mail-train on the evening of the 6th October, crossing the Zambezi next morning in a stern-wheeler. A lighter was lashed on each side of the steamer, and into them the men, women and kit were loaded. From the Zambezi to Beira, we travelled in the Trans-Zambezia railway which had only just been opened to traffic. It was a very hot and dirty journey, and the engine broke down with great frequency, so that we were all very pleased when we reached Beira about 10 o'clock that evening. The company were accommodated for the night in some large tin sheds where they found water and firewood ready for them on their arrival.

Next morning, the 8th October, at 7 o'clock, we were taken out in a lighter into Beira Harbour where we embarked on the B.I. S.S. Karoa. Both the sea and great ship were new sights to the majority of the men—the nearest approach to the latter being the gunboat on lake Nyasa and their amazement was wonderful to see. The quarters provided for the company were two large hatches, with galleys and washing appliances on the forward well-deck. The first problem the men were faced with was the lighting of their galley fires with coal. Coal was a material they had never seen before, in fact the sergeant-major said that it was impossible to make a fire with rocks! In the end, two lascars had to be brought from the stoke-hold

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to show them how it ought to be done. Ice was another complete novelty, and great consternation and amusement were caused when a lump was dropped down the back of the youngest bugler.

Everything was done on board by the officers of the Karoa to make the voyage comfortable and pleasant, and, thanks to the kindness of the weather, the men experienced very little sea-sickness. We touched at Mozambique, Dar-es-Salaam, Zanzibar, and Mombasa, on our way north, and at the British ports small parties were allowed ashore to have a look at the sights. On the 19th October, we rounded Cape Gardafui and at 2 p.m. on the 20th, we dropped anchor in the harbour of Berbera, the port and capital of our Somaliland Protectorate.

There was little or no improvement in the situation in Somaliland. Various fines in rifles had been put on the tribes who had resisted the imposition of the tax, but none of these had been paid. The tribes were still out of hand, and the roads unsafe for small parties, in spite of the fact that the Government had decided to withdraw the tax. So bad, indeed, had become the situation, that the Government had been forced to borrow a company of the 41st Dogras from Aden to assist in garrisoning the Protectorate. This company had arrived at Berbera one month previous to our landing, and, whilst on its way up country, had had its baggage-guard attacked in the Sheikh pass, two men being wounded and two rifles captured.

Our own reception at Berbera by the local inhabitants was not too friendly. The men and kit were landed in lighters and this was a long and tedious business as the lighters had to be propelled by hand. While this was being done, the officers remained on the Karoa, proposing to land in the customs' boat as soon as the lighters were close in shore, but when these had done about half their journey to the beach a wireless message was received on the ship from the Chief Commissioner of Police requesting the officers to come on shore at once as he feared a hostile demonstration against the company on its landing. However, in spite of the presence of a large and unpleasant looking mob near the beach, the landing was carried out without molestation, and the company took up its quarters for the night in an old quarantine camp.

We remained at Berbera for a few days while arrangements were being made for our march up country, for we were to go to Burao, the Military headquarters of the Protectorate, which was about 90 miles south of Berbera. We left the port on the evening of the 24th October and took no risks on the way. We moved in file with about ten yards between the ranks, and the women and children marched in the space so left. We had a pony troop of the Camel Corps with us, and they found the advance guard and flankers, as well as the escort for the long column of baggage-camels carrying our kit which trailed behind us. At every halt we formed square and pushed out pickets, and going up the Sheikh pass, where the Dogras had been attacked, we marched with fixed bayonets, one round in the

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chamber, and four ready in the magazine. However we finally arrived at Burao on the morning of the 30th without any untoward incident.

On our arrival at Burao, we were informed that we were to be incorporated in the Camel Corps, in place of one Somali company disbanded, and to be made into a camel company. To the layman this may not seem to be a very difficult undertaking, but to those who were to be responsible for the process it was obvious that it was an experiment the result of which was very doubtful. The Yaos are a purely agricultural people who dwell in villages and live on their crops. They keep no animals of any kind except a few goats, and these are left to look after themselves as best they can, and they were consequently a people totally deficient in animal-knowledge. Camels, of course, they had never seen before. An efficient camel company demands that the men should not only be able to ride and manœuvre their camels successfully; the care and management of the camel is equally essential. The riding camel is not the hardy beast the burden camel is, he is a highly bred animal and needs almost as much looking after as a horse. It was therefore a difficult task that lay before us, and the training would be long and arduous.

The first business was to teach the men to saddle-up and to ride the camels. At the same time dismounted parades had to be held to teach mounted drill in place of the infantry drill they already knew. For the mounted work the company was divided into "rides," and every morning for an hour before breakfast the men were jogged about very much in the same way as recruits are treated in the riding-school at home. Saddling-up classes were held under N.C.O's of the Somali company, the language difficulty proving a serious but not insurmountable obstacle. During the preliminary training we possessed neither camels nor saddlery of our own, but borrowed what we wanted from the Somali company every day. As soon as the men began to show improvement in riding, instruction in camel management was taken in hand. This included grazing and watering duties, besides the general care of the camel. Every day, parties were sent with the Somali grazing-guard and to the watering-troughs, while a platoon went to stables every evening. By the middle of January the training in riding was sufficiently advanced to enable the men to be drilled in troops and riding-school was abandoned for troop-drill. Sixty-five camels with saddlery were handed over to the company, and pack-saddlery for two machine-guns. We took over our own grazing-guards and the general care of the camels and turned into stables every evening to do our own work. Five Somalis were posted to the company for technical work, 2 salutris, 2 saddlers, and a fitter. The men picked up their new duties very quickly and showed great keenness to learn. Not a murmur was raised at having to undertake work that was so strange and difficult, and it speaks volumes for the good temper and adaptability of the men that the company should in three months have made such progress.

The forming of the company into a camel company entailed a

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complete change in the existing organisation. We were now formed into troops in the cavalry style, three rifle troops, one machine-gun troop, and a dismounted troop, the latter consisting of the Lewis and Stokes gunners. As soon as the company of the 41st Dogras returned to Aden, the dismounted troop was to go to Sheikh to take over the protection of the R.A.F. detachment stationed there. Our name was also changed and we became "B" Nyasaland Company of the Camel Corps, "A" Company being the Somali camel company, and "C" the pony company.

At the beginning of 1923, the Government decided to take action against those tribes who had not paid up their fines of rifles. The Camel Corps was therefore ordered to go and attack these tribes, to seize their stock, and to burn their huts up to the value of the rifles that were due. The column entrusted with this task was to consist of the pony company, "A" Company, a detachment of 44 men (with 2 machine-guns) of our company and the dismounted troop of our company which was to do escort for the ration convoy. The fact that after only three months 44 men were considered far enough advanced in their training to go on active service speaks for itself. To the mounted detachment of our company was attached a party of Somalis from "A" Company to act as camel-holders in case of dismounted action, to lead the gun and ammunition camels of the machine-gun troop, and to give general assistance in the management of the animals.

On the 27th January the column left Burao, and by making two forced marches by night, arrived before dawn on the 29th at the area where the camels of the chief offending tribe were grazing. At daylight the column surrounded the zarebas containing the camels, and 500 were captured without any difficulty. Their guards were taken completely by surprise and no resistance whatsoever was offered. The captured stock was sent into Burao under escort, the column acting as covering force until the camels were within safe distance of their destination. The column then advanced on the area containing the huts of the same tribe. On our approach the hostile tribesmen immediately evacuated their huts and disappeared into the bush, so that the column was able to destroy the huts without opposition. On the 8th February the column returned to Burao, having accomplished its mission with complete success.

After three weeks' rest the column again went out on the second march against the next most important tribe. The same success attended this operation as the first one, and, after a fifteen hour continuous march, 700 camels were captured and several huts burnt. These two successful raids had great effect on the country. The remaining hostile tribes immediately came in and paid up their fines of rifles, other tribes which had been sitting on the fence hurried to express their loyalty to the Government, and the country became comparatively peaceful. The Yao detachment which accompanied the column carried out their part efficiently and well, and though they

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found the long treks by camel very exhausting and trying, they never failed to acquit themselves with credit when their services were called upon.

These successful operations combined with the rapid advance of our company towards efficiency decided the Government to dispense with the services of the company of the 41st Dogras, and sometime in March this contingent returned to Aden. Our dismounted troop was then sent to Sheikh to relieve one of the Dogra platoons and to take over guard of the aeroplanes there.

Nothing very much could be done during the hot weather in the way of training. The musketry course was fired off with excellent results, and during June and July the Corps went into camp right in the interior to escape the wind and sand-storms of Burao. It was at this camp that the only serious manifestation of bad feeling between the Yao and Somali soldiers was witnessed. On the whole the relations between the two native races had been extraordinarily good, and there had been very little friction between the companies. On the way out to this camp the Somali camel company, being the better riders and possessing the better camels, put on the pace and easily out-distanced the Yao company. When these ultimately arrived at camp, some two hours after the Somalis, the latter laughed at them, intimating that they were no good and ought to return to their own country. This, naturally, caused a certain amount of ill feeling between the companies, and, for a short time, there appeared a danger that the attempt to get Yaos and Somalis to work together as one corps would be wrecked. However, strenuous efforts on the part of the officers of both companies straightened things out, and, after a period, the former friendly attitude of the two races towards each other was resumed.

As soon as the cool weather returned steady training was at once recommenced, and by the end of the year, the company could be considered sufficiently competent to undertake any task it might be set. We were issued camels and saddlery to bring us up to full strength and to bring us into line with the Somali company, so that we were now in all respects a camel company ready for action. We needed no outside help when we went on trek except from our own five Somalis, and were able to take upon ourselves the entire care and management of our camels. Since the operations of the preceding Spring the tribes had been very peaceful, but in January 1924 a certain amount of unrest showed itself among them. The Government decided that a few strong patrols sent through the disaffected areas would have the desired effect of keeping the tribes quiet. During the months of January and February three of these patrols were sent out and were away from Burao for periods ranging between one and three weeks. Two of these were drawn exclusively from the Yao company, and the work was carried out with complete success in every department.

Thus, after fourteen months, the experiment had proved itself

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The Company on Patrol.

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a success. Whereas we had arrived in Somaliland an infantry company, trained in infantry work only, we had now become a trained camel company, able to march and manœuvre on camels and to fight on foot. Many a time it seemed as if ultimate success would never be attained, but we had always persevered, and we now enjoyed the fruit of our labour. There was still much to be done—what soldier is ever completely trained—but the main difficulties had been overcome and the worst was well behind us. His Excellency the Governor, when inspecting the company early this year, expressed himself fully satisfied and extremely pleased with our mounted work. And what of the men themselves? Brought into a foreign country peopled by a different native race, speaking a strange language, faced with unknown conditions, made to ride and look after a strange and fearsome animal, they never grumbled, never gave up trying, and never ceased to show interest and keenness in their training. Savage, uncivilised negroes, they kept up their spirits and morale under trying conditions and proved themselves to be of the stuff that true soldiers are made of. It is to them that the successful result of this experiment in training is due.

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THE REFORMS OF Mr. HALDANE IN 1906-7.

By CAPTAIN M. N. T. GUBBINS, O.B.E., M.C., R.A.

THE changes in Army organization effected by Lord Cardwell went a long way towards providing the means of expansion necessitated by the South African War. His system also worked well in the smaller campaigns in Ashanti and in Egypt in 1882. But when the war broke out in South Africa his organization did not admit of rapid mobilization and as the war progressed even greater expansion was found necessary. All the regular troops having been despatched overseas, it became necessary to make emergency schemes to cope with the defence of the United Kingdom. Reserve Cavalry Regiments, Provisional Battalions and Garrison Battalions were formed. The Militia was embodied, and special training was instituted for Volunteers.

At the end of the South African War two Special Commissions were formed to propose possible improvements. The Elgin Commission reported that :—

> "No military system will be satisfactory which does not contain powers of expansion outside the limit of the Regular Forces of the Crown."

The only means of expansion for our Regular Army was from the Army Reserve, built up as a result of Lord Cardwell's short service act (The Army Enlistment Act), and from recruits who were trained at the Depots, which as we shall see later was inadequate.

For lack of important services like ammunition and transport columns, and supply and hospital personnel, we could not put into the field much more than 3 Regular divisions; and after mobilizing such a force there would be in many services a complete lack of reserves from which to make good the wastage of war. The Militia was only liable for home service, though during the South African War several militia battalions served in the theatre of war and in the Mediterranean. The Volunteers were only liable for home defence, though they sent special service companies to take the place of line companies sent to Mounted Infantry.

In 1903 the Norfolk Commission was also appointed "to inquire into the organization, numbers, and terms of service of the Militia and Volunteers."

Its report was as follows :—"The Militia in its existing condition is unfit to take the field for the defence of this country."

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"The Volunteer Force, in view of the unequal education of the officers, the limited training of the men, and the defects of organization and equipment, is not qualified to take the field against a regular army."

The whole system of organization of the Auxiliary Forces had grave defects.

Neither the Militia nor the Yeomanry had any staffs of their own, their administrative services were a negligible quantity, and permanent organization higher than the regiment and the battalion was unknown. They were only a collection of Units. It was impossible to place this army on a war footing.

It was not until Mr. Haldane became Secretary of State for War that the reforms, necessary for the proper expansion of the Regular Army and for the sound organization of the Auxiliary Forces, were brought about.

Mr. Haldane very soon realised that there were many faults in the existing system.

It is interesting to refresh one's memory very rapidly on the principles of organization peculiar to the British Empire on which Mr. Haldane's reforms were based.[1]

The British Isles are the centre of an enormous and scattered Empire, the parts of which are separated by great stretches of ocean from the parent islands and from each other. No other nation possesses this peculiar feature to anything approaching the same extent. First, therefore, in the order of importance comes sea-power, backed up not only by adequate oversea garrisons, but by an expeditionary army, kept at home in time of peace, but so organized that it is ready for immediate transport by the fleet to distant scenes of action, and is capable of there maintaining long campaigns with the least possible dislocation of the social life of the nation. Such an expeditionary army is essentially a long-range weapon and can be raised only on a long service basis. By long service, Mr. Haldane did not mean the pre-Cardwell system under which soldiers served until they were pensioned, but a system under which men served long enough (6 or 7 years) to give a fair period of service abroad after they had been fully trained, and thereafter a further period (5 or 6 years) in the Army Reserve, liable to be called up and sent abroad in a national emergency. Those who compose the Expeditionary Army must accept the Service as their profession for some years, and with it the obligation to embark without any delay. Modern conceptions of mobilization preclude any idea that time will be available for a search for those willing to go.

Our home-defence Army ought to be small relatively to that of continental nations. This is a further result of our geographical conditions. The home frontiers of this country are not land but sea frontiers. But considerations of strategy require that the other force which is raised for the purpose of service over-sea, should be relatively

[1] Compulsory Service by General Sir Ian Hamilton.

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greater than would suffice for other nations that have not, to anything approaching the same extent, to reinforce distant over-sea outposts.

But just because Great Britain is not compelled to maintain enormous armies for the defence of its home frontiers against invasion, it can organize a relatively large over-sea professional force, and keep it even in peace time, not only in being but in a high state of training, and fit to serve for a prolonged campaign without exhausting the country in either men or money. We have nearly 76,000 British soldiers in India, and some 37,000 in other over-sea garrisons, and an Expeditionary Force which mobilizes at a figure of about 170,000. In other words we recruit and maintain a professional long-range army of nearly 300,000, and we are able to do so because our geographical position leaves us free to concentrate on this.[1]

The Regular Army contained a large number of services which were more or less of a civilian nature which could be efficiently performed in war by civilians, who gave a part of their time to military training in peace.[2]

For reasons of economy this transformation was accompanied by certain reductions in the effectives. Eight infantry battalions were reduced.

The principle of the system must be to retain at home in peace sufficient Regular troops for the purpose of finding drafts for the overseas forces, and then to organize out of them as complete an Expeditionary force as possible. The forces which we were compelled to keep at home for overseas drafts could be so organized as to provide on mobilization an Expeditionary Force of 4 Cavalry Brigades and 6 Infantry Divisions composed of regulars serving with the colours, reservists, and men employed and trained on a militia basis.

No provision existed for further expansion in case of a war of great severity. In order to do this the whole system of organization of the Auxiliary Forces would need to undergo certain changes, which would give them in peace an organization suitable for war.

Lord Cardwell had taken the first step in Army reform towards the binding together of the Regular and Auxiliary Forces by the formation of Brigade Districts comprising two regular battalions, two militia battalions and a depot, commanded and administered by a Lieutenant-Colonel. But in doing this he had taken away the Militia from the Lords Lieutenant.

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[1] It is interesting to compare this statement with the situation that obtains in the present day. No longer does our geographical position leave us free to concentrate only on our long-range expeditionary army. The Air Force must absorb a considerable proportion of the man-power hitherto available, and as the necessity for home defence becomes more apparent, this proportion is likely to increase. The reduction in the available numbers may to some extent be counterbalanced by the post-war reduction of overseas garrisons, by the total disappearance of the Militia or Special Reserve, and by the present day liability of the Territorial Army for service overseas. In spite of these changes however, it does appear that the demand on our volunteer man power is likely to be even greater in the future than it was in the past.

[2] It is now realised that the nature of some of these technical services is such that they can be performed by civilians who need no military training in peace.

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Mr Haldane aimed at bringing the Army even nearer to the people in the localities and realized the necessity of encouraging the people to adopt the Volunteers. He considered it therefore necessary to hand over some measure of authority over these Territorial forces to County Associations, which would be really representative of local feelings.

The Government proposal was therefore to concentrate on the building up of an Expeditionary Force, immediately available for use overseas in war, with a territorial organization behind capable of supporting it.

Mr. Haldane's scheme was to organize the National Army of the future as a Field Force and a Territorial or Home Force.

The Field Force was to be so organized as to be ready in all respects for mobilization immediately on the outbreak of war. The Territorial Force would be mobilized also but with a view to its undertaking in the first instance systematic training for war for a period of at least 6 months.

As regards the Field or Expeditionary Force the chief requirement was the constitution of a strong Reserve for the Regular Army. The numbers of this were fixed in accordance with the presumed wastage of the first six months of war. The Regular Army Reserve being considered numerically insufficient to meet this demand, it was necessary to create another Reserve.

The Militia could not be compelled to serve abroad and was therefore an uncertain resource, so Mr. Haldane formed the idea of transforming it into a Special Reserve, in which the terms of enlistment specifically included liability to serve abroad in emergency.

The Special Reserve was constituted at first of Militiamen who agreed to the new conditions, and afterwards of voluntarily enlisted recruits. It was divided into two categories, the first and more fully trained assigned to the duty of furnishing the reliefs for the combatant troops; the second assigned to the non-combatant branches.

The first category supplied all arms except the cavalry which had no need of it.

For every pair of line battalions the nucleus of a third Regular battalion was to be maintained in peace at the existing Infantry Depot barracks to train recruits of the Special Reserve for 6 months in the first year, and to provide a short annual training in subsequent years. Thus the infantry of the Special Reserve consisted of 74 third battalions of their line regiments, and 27 extra battalions assigned to fortress garrisons.

As regards the Artillery, the batteries surplus to the requirements of the six divisions of the Field Force were to be distributed to convenient centres throughout the United Kingdom, where they would in peace and in war train the officers and men of the Special Reserve, and on mobilization be brought to a strength as 6-gun batteries, enabling them to train and supply the drafts required for batteries and ammunition columns overseas.

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Similar arrangements were to be made for all arms and services.

The second category of the Special Reserve provided for the non-combatant services—supply and transport (Army Service Corps), medical and veterinary services, etc.

The Militia having gone to the Special Reserve, there remained available for home defence the Volunteers and the Yeomanry. Mr. Haldane made out of these the Territorial Army.

In each County, administration, as distinguished from command and training, was to be vested in the County Association acting under the direction of the War Office. The responsibility for command and training was to be vested in the General Officer Commanding. The period of annual consecutive training for the Territorial Force was to be not less than 8 days, nor more than 15 days in the year. There was to be a considerable increase in the number of local schools of instruction, drill halls, rifle ranges, and courses of instruction for junior and senior officers.

The shortage of officers was to be met by Supplementary Officers who after performing a period of preparatory training with the Colours, would return to civil life with the liability to serve on general mobilization. The Officers Training Corps, senior and junior, was formed at the Universities and Schools from which the Supplementary Officers would be recruited.

This is an outline of the framework designed by Mr. Haldane which by 1914 had been built up into an Army at home organized for war.

This Army at the outbreak of the war consisted of :—

(a)	Regulars.	1 Cavalry Division.
		6 Infantry Divisions.
	Special Reserve.	1 Battalion per Line Regiment and 27 extra battalions serving in the Colonies.
		Training Brigades, R.F.A.
		Supplementary Officers.

The Regular Army was brought up to war strength on Mobilization by the Regular Reserves which together with the Special Reserve maintained it during the first four months of the war, whilst recruits were being trained at the Depots.

(b)	Territorials.	14 Divisions.
		14 Yeomanry Brigades.
		Coast Defence Troops.
		O.T.C.

These were organized on the same lines as the Regular Army and were a genuine second line to the Regular Army.

The strategical weakness of the Cardwellian system and of Mr. Haldane's system was the absence of any reserve troops at home available for the reinforcement of our threatened frontiers without a general mobilization. This has been remedied in our present organization by the introduction of a system of partial mobilization.

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THE BRITISH POSITION IN PALESTINE. *

By CAPTAIN S. COLLINGWOOD, M.C., R.A.

WE have heard so much about the Jew and Arab problems of Palestine during the past five years that we begin to wonder whether a practical solution enabling these two peoples to live peacefully together will ever be found. At times the task of finding this solution appears so difficult that we are tempted to ask ourselves how we came to take upon our shoulders so onerous a burden. Instead of bringing peace to the country we seem to have brought confusion. We have tried to improve the administration by introducing European methods; we have established a sound fiscal system and made great strides in matters of education; we have steadily developed the communications of the country and thereby increased the value of her products; but we receive little thanks in return for what we have done. This is the way of the world, and it may be said that our efforts to develop other parts of the Empire have not always met with the approval of the inhabitants. But is it fair to compare Palestine with other parts of the Empire? In Palestine we get no return for our efforts, while in our other possessions we are always opening up new markets for our export trade.

Even the argument that Palestine is valuable as a link in our air route to Baghdad can no longer be considered now that we have decided to relinquish the Iraq mandate.

Why, then, did we go to Palestine? What are we doing there? and why do we still remain there?

It will be the endeavour of this article to inquire into these questions, and if possible to supply data from which suitable answers may be framed. In order to do this we will examine, first of all, the events which led up to our entry into Palestine; then the problems that confronted us when we came to dividing up the occupied territory; and finally the factors governing our present and future policy in the country.

DEFENCE OF THE SUEZ CANAL IN 1914-15.

In order to get a clear idea of the political and military reasons governing our invasion of Palestine it is necessary to consider the situation in the Near and Middle East during the early days of the war.

As soon as hostilities broke out with Turkey we were forced to put the Suez Canal into a state of defence, as any interruption of our communications with India and the East at this point would have had

* N.B. Authors are alone responsible for facts and opinions expressed in their papers. See notice under Contents of Journal.

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disastrous results. The Suez Canal has rightly been called "the jugular vein of the British Empire" and its importance was well illustrated during the war when it served as a channel for a ceaseless stream of men and material between the Eastern and Western theatres of war.

There were few troops to spare for the task of defending the Canal and so its defensive zone had to be restricted to the immediate vicinity of the eastern bank. The first Turkish attack took place in February, 1915, and was a failure, but it showed us that the desert strip between the Canal and Palestine was no great obstacle to the enemy's advance, and that, in order to prevent him penetrating to the Canal Bank, it was essential to give our defensive system greater depth.

We therefore advanced into the desert and occupied all water points that might serve as possible "points d'appui" to the enemy, but we felt that the Canal could never be really safe until we could take the initiative and carry the war into the enemy's country. So long as we adopted a passive defence, the Turks would have ample opportunity for concentrating their forces and making preparations for fresh operations. Our troops were still too weak to attack them, and so we began to look round for some other means of worrying them.

Negotiations with the Arabs.

It was decided that an attempt should be made to bring the Arabs into the war on our side, so that their irregulars might be used for attacking the enemy's left flank across the Mecca railway. For many years a spirit of discontent against Turkish suzerainty had been growing up among the Arab tribes, and it was thought that very little persuasion would be necessary to make them break out into open insurrection. The discontent expressed itself in the Pan-Arab movement which aimed at the formation of an all Arab Empire embracing the whole of Arabia from the Mediterranean to the boundaries of Persia, and which, no doubt, owed its origin to the ideas of nationalism that had spread across from Europe. The movement had been unable to accomplish anything up till then owing to the jealousies of the Arab chiefs.

Our first task therefore was to find a chief of sufficient importance to lead the revolt against Turkey. King Hussein of the Hedjaz was selected and negotiations were commenced with him. After a lengthy correspondence on the subject of the future status and boundaries of the new Arabia, we offered to "recognize and support the independence of the Arabs" within a territory bounded by the 37th Parallel on the North, as far as the Persian frontier; by the Persian frontier on the East as far as the Gulf of Basra; by the Indian Ocean on the South, with the exception of Aden; by the Red Sea, the Mediterranean, and a line running through Damascus, Homs, Hama, and Aleppo on the West, thus excluding all the sea coast north of Acre. It is interesting to note that we did not mention Palestine and so presumably we were prepared to let it pass under Arab suzerainty.

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King Hussein would not agree to the alienation of any part of the Mediterranean seaboard, but was willing to leave further discussion on the matter until after the war. Eventually he was persuaded to throw in his lot with the Allies by the action of the Turks themselves, who, from the beginning of 1916, had been increasing the strength of their garrisons in Western Arabia with a view to conducting operations against the Red Sea and the shores of Africa. He realized that the Turks' next step would be to take over the administration of his territory and push him into the background, and decided that the time had now come to act. The Arab revolt broke out on June 5th, 1916, and caused increasing annoyance to the Turks until the end of the war.

Allied views concerning the future of Arabia.

Up to this point it will be seen that we had no thought of occupying Palestine. We were far too occupied with events in other theatres of war to think of invading new territory. Moreover the very fact that we were discussing the creation of an independent Arabia with the boundaries described above shows that the idea of freeing Palestine for the Jews had not crossed our minds. Our views concerning the future of this part of the world were still unformed and it was not until the French and Russians began to show interest in the matter that we were forced to make a definite statement of our policy.

This led to negotiations between the Allies, in which each laid claim to certain zones of enemy territory. There are certain people who think that if Great Britain had been left alone to deal direct with the Arabs over the matter of territory, the course of events after the war would have been very different, and, instead of remaining in Syria and Palestine, we should have gradually withdrawn from these countries in the same way as we are now doing from Iraq. These people maintain that it was the claims of our Allies to the northern portions of the ex-enemy territory that made us decide to keep Palestine and the country south and east of it within our sphere of influence, and thus form a friendly buffer on the Asiatic side of our communications through the Suez Canal and the Red Sea.

Whether we accept this theory or not, we are forced to admit that our Allies' claims to Turkish territory were considerable and unexpected, and caused us a certain amount of anxiety. Particularly may be mentioned the Russian claim to Constantinople which we recognised in the Spring of 1915, in spite of the fact that for half a century we had been making every endeavour to prevent Russia obtaining possession of the Ottoman capital.

In order to prevent misunderstanding, the French and British drew up the Sykes-Picot Agreement in May, 1916, in which their separate zones were defined. It divided Turkey in Asia as follows :—

1. A zone of British administration embracing Mesopotamia and a small enclave on the Syrian coast, including the ports of Haifa and Acre.

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2. A zone of French administration embracing Cilicia, a large portion of central Anatolia, the Lebanon and a broad strip of the Syrian coast.

The rest of the country with one exception was divided into two spheres of influence; the French taking the northern section and the British the southern. The exception was Palestine which was to be internationalized.

We thus hear Palestine mentioned for the first time, though the decision to internationalize it shows that the Allies must have already discussed its future at some length, and that their views on the subject were divergent. Internationalization is rarely resorted to except as a compromise when the negotiating parties cannot agree. Probably the religious aspect entered largely into the Allies' discussions, and no doubt Russia, as the leader of the Orthodox Church, whose faith predominates in that part of the world, thought that she ought to have the custody of the Holy Land. Both France and Britain would have been against this, and so a compromise in the form adopted was the only course open to them.

The British Advance into Palestine.

As previously stated, our operations during 1916 were confined to the occupation of water points in the Sinai Peninsula, the Turk being left in occupation of El Arish, and it was not until 1917 that a decision was made to advance against them in Palestine. This decision was in no way influenced by any desire to acquire Palestine for the Jews. The factors governing it were purely military as an appreciation of the situation at that time will show. In "British Campaigns in the Near East, 1914-18"—Edmund Dane, the following reasons are given for the offensive :—

> "In January 1917, the success of General Maude's operations against Kut, combined with the suppression of the movement led by the Senussi of Solkum on the West, influenced the British Government to pass in Sinai to the offensive. Assuming it to be successful the offensive would both assist the British attack in Mesopotamia and safeguard Egypt."

This offensive was launched by General Allenby on the 27th October 1917, and did not come to a halt until after Jerusalem had fallen on the 9th of the following December.

Thus at the beginning of 1918 we found ourselves in occupation of the greater part of Palestine.

The Balfour Declaration.

In 1917 Russia fell out of the War, and the decision to make Palestine an international territory was revised. The two things may or may not have had any connection, but it is interesting to note that they happened within a few months of each other. Britain

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with the acquiescence of the other Allies was allowed to publish in November 1917 a document which has since become famous as the Balfour Declaration. In it she practically took upon her shoulders the championship of the Jewish cause in Palestine. The wording of this document was as follows :—

> "His Majesty's Government view with favour the establishment in Palestine of a National Home for the Jewish People, and will use their best endeavours to facilitate the achievement of this object."

The reasons for the Government committing themselves in this fashion are obscure, but they must have appeared weighty at the time. That it was necessary to issue a definite statement concerning the Allied policy towards Palestine can be understood, but it could have been issued just as easily as an Allied Declaration. No doubt, the Government's attitude was largely governed by sentiment, but expediency and propaganda must also have played a great part in it. We were flushed with the pride of victory. We had gained a large strip of enemy territory lying across the main land route to Egypt. Possession of it would make safe our Suez Canal communications for all time. Other countries were pegging out claims for themselves in Syria and Anatolia. Why should not we take steps to secure a country that we had won by force of arms? The restoration of the Holy Land to the "chosen people" would be acclaimed with satisfaction by Christian communities throughout the world, and would be a token of gratitude to the many great Jews who were so nobly helping our cause. These may have been a few of the thoughts that passed through the minds of our statesmen at the time.

Administration of Palestine by the Military.

Immediately we had made our Declaration we began to put the policy of the National Home into effect. A Jewish Commission was sent out, early in 1918, to advise our Administrators in all matters concerning the Jews, and arrangements were made to import large numbers of Jewish immigrants into the country as soon as hostilities should cease. The Arabs, who formed more than 80% of the population of Palestine, took alarm at this and said that such a policy would assuredly end in turning them out of house and home. They had a champion in King Hussein, who, it will be remembered, had never agreed to the partition of lands lying along the Mediterranean from his future Arab Empire.

He took up their cudgels for them, and began pressing the Allies for something more definite about the future status of the Arab people and the boundaries of his new Kingdom. He worried them to such an extent that in November 1918 he elicited the Anglo-French Declaration from them, which stated that "the end aimed at by France and Great Britain was . . . . the establishment of national governments and administrations, drawing their authority from the initiative and free choice of the native populations." Knowing that the Arab

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populations predominated in the territories under consideration, King Hussein accepted this declaration as tantamount to saying that Palestine would be placed under Arab administration.

But the Armistice found the British in occupation of a wide stretch of country, from the northern boundaries of Syria to the Sinai peninsula, and far from handing it over to the Arabs they showed signs of prolonging their stay indefinitely by dividing it up into four districts for the purposes of administration. The districts were called O.E.T.A. (Occupied Enemy Territory Administration) North, South, East and West. The North and West were soon taken over by the French, the East was placed under Arab administration, and the South consisting of Palestine, remained under British control.

The British Military Administrators had the difficult task in front of them of carrying out a pro-Jewish policy which was inacceptable to the majority of the population. The Arabs flung the Anglo-French Declaration in their faces and asked how they could reconcile it with the Balfour Declaration. They requested that, if they could not be allowed to form part of the new Arab Kingdom they might at least be allowed to form an independent state of their own. Their agitation was fomented by the effendi class, who, under Turkish administration, had grown rich by a ruthless exploitation of the fellaheen, and who had begun to realise that the new British Rule would mean a curtailment of their exploiting activities, accompanied by considerable pecuniary loss. They also feared that the efficient Jewish farmers would acquire too much land under the new system. They preferred that the land should remain in the hands of an inefficient farming community to whom they could lend money at extortionate rates, and upon whom they could foreclose whenever they felt a desire to increase the size of their personal domains.

Arab discontent came to a head with the anti-Jewish riots in 1920, resulting in the death of six and the wounding of about two hundred Jews, and the people in England began to realise that the Arab problem in Palestine was a serious factor to be reckoned with.

Civil Administration.

On July 1st 1920, a Civil Administration took over control of the country, and a Constitution under Sir Herbert Samuel as High Commissioner with an Executive Council and a Legislative Council, partly nominated and partly elected was eventually authorised. The political situation remained unchanged, and the Arabs still refused to co-operate with the Government.

An Arab Delegation was despatched to London to air their grievances before the British Government. These were as follows :—

(a) That the British Government by the Balfour Declaration intended to convert Palestine into a Jewish State. It had been openly stated on several occasions by Jews of world-wide repute that it was intended "to make Palestine as Jewish as England is English."

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(b) That the Zionist Commission had too much influence with the Government.

(c) That the Zionist Commission was working in co-operation with a world-wide Jewish organization to introduce so many Jews into Palestine that in time they would be able to bid for political supremacy.

After several months of fruitless effort in England, the Delegation returned to their own country without accomplishing anything. Rioting again broke out in 1921. This time it was at Jaffa and was more serious. A Court of Enquiry was held on its causes, and, as a result of the findings, the Jewish Commission pledged itself to abstain from interference with the Administration.

In July 1922 the conferring of the Mandate for Palestine upon the British, destroyed any remaining hopes the Arabs may have had about making the country an autonomous Arab State. But they remained as intractable as ever and in 1923 when the first elections were held under the new Constitution, they declared a boycott upon the voting booths, and caused the elections to be declared null and void.

A further attempt was made to conciliate them at the end of last year by asking them to form an Arab Agency similar to the Zionist Agency (as the Jewish Commission is now called), but they flatly refused to take any such action, and since then the High Commissioner has been compelled to carry on the Administration with an Advisory Council consisting of official members only.

Our future Policy.

One thing is now certain; we shall remain in Palestine until the Jewish position in that country is secure and until responsible government can be set up. The Arabs have got to be won over and induced to enter the Councils. There are signs that their extreme intractability is beginning to give way. The effendis are beginning to lose their grip on the fellaheen and the latter are slowly waking up to the fact that their conditions have improved enormously under the British Administration. The stories that the Arab peasant was told about Jewish domination have proved untrue. Instead of his lands being seized by Jewish immigrants, they are now more secure than they have ever been. Unjust taxation no longer grinds him down. Improved communications give him a better market for his produce.

It will need but a year or two to win him over to the new Administration, and as soon as this has been done the non-co-operative policy of the effendi can be ignored. But having induced the Arabs to enter the Councils, there will still remain the task of educating their electorate up to the same standard as the Jewish. At the moment they lag far behind. Their education is of a religious and primitive type and will require a thorough overhauling before it can produce the efficient results of the up-to-date education given in many of the Jewish Schools.

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The education of the Arabs is one of the principal factors governing the length of our stay in Palestine. We cannot withdraw until Responsible Government has been established, and we cannot give Responsible Government to the people of Palestine until their educational qualifications are the same throughout. Other factors which will influence our decision to withdraw are :—

(a) The attitude of France towards her Syrian Mandate, and the date on which she decides to give it up. We shall probably remain in Palestine as long as she remains in Syria.

(b) The attitude of Turkey towards Palestine. Her agitation along the French Syrian frontier, and her demand for the return of the whole vilayet of Mosul show that she is by no means satisfied with her present boundaries. We have therefore no reason to think that she is content with the loss of Palestine and that she will not make a bold effort to over-run the country as soon as our backs are turned.

(c) The attitude of the Arab States, who, although they have now decided (at the recent meeting between King Hussein and his son Abdullah) to adopt a neutral attitude towards the political aspirations of the Arabs of Palestine, might easily, in the event of a revival of the Pan-Arab Movement, come forward with a fresh demand that the country should be placed under Arab rule.

These various considerations may cause us to remain in the country for several generations, but whether we stay there for ten years or fifty, let us continue steadfastly in the task that is set before us. Let us bring to these people, subject for so many centuries to the domination of the Turk, a new reign of freedom and peace; let us give them security and prosperity; let us teach their diverse races to live happily together in a common citizenship; let us do these things so that when the time comes for our withdrawal we may leave behind us firm friends and willing partners of the British Commonwealth of Nations.

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THE NAVY.

THE LEFT WING OF THE ALLIED ARMIES.

Translated from an article in the "Revue Militaire Française," April 1924. By Capitaine de Vaisseau Thomazi. "La Marine, aile gauche des armées alliées."

(Translated by Brig.-General W. Evans).

ON October 15th 1914, the race for the sea which began immediately after the battle of the Marne, had reached the mouth of the Yser. On the 16th, General Joffre pointed out to the French Admiralty and to Lord Kitchener the great effect action by the allied navies would have on the support of the left flank of the allies now resting on Nieuport.

The Anglo-French convention of 1913 allotted to England, in the event of an alliance against Germany, the supervision of the North Sea and the Straits of Dover. In conformity with this agreement, we only had in that area, small torpedo boats and submarines both incapable of giving the required support. Their only weapon was the torpedo, as the 37 m/m gun carried by the torpedo boats was only of use for firing on small vessels.

Admiral Rouyer who commanded the Channel ships conducting the commercial blockade, was ordered to send all the destroyers to Dunkirk. The *Capitaine Mehl*, the *Francis Garnier*, the *Intrépide*, and the *Aventurier*, arrived on October 18th escorted by the *Dunois*, whose captain in command of the flotilla put himself under the orders of the military governor. At the same time the English Dover flotilla under Admiral Hood, was reinforced by small monitors, gunboats, and old ships, on each of which had been mounted a gun of old pattern, and from October 18th the allied land front was carried out into the North Sea, by a mobile force armed with 6 and 4-in. guns.

For this warfare, where it was often necessary to engage unseen objectives and destroy their personnel, the ships were badly equipped. Most of the projectiles were armour piercing, and their ammunition supply, calculated for a short engagement, was exhausted in a few hours. Their high velocity guns wore very quickly and their accuracy deteriorated in consequence. However, at that time, the front was still so short of heavy artillery that this force, indifferent as it was, was not entirely useless.

Admiral Hood personally directed the operations from on board the cruiser *Attentive* or the destroyer *Amazon*, then after the latter had received a shell on the waterline, on one or other of the torpedo boat destroyers. On the 30th he actually conducted the action from on board the *Intrépide*, when for the first time in history a British

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Admiral's flag could be seen flying from a French ship-of-war—a valuable witness to the comradeship of the two navies, so long rivals now allies.

Up till November 2nd, operations consisted of a continuous bombardment from morning till evening of the German lines between Nieuport and Ostend, firstly to support the French attack along the coast, then to help stop the enemy from counter attacking with the object of gaining the northern ports. The German high command must have regretted not having occupied these in September when there was nothing to prevent them from doing so. At night the ships ceased fire as they could not see their targets, and moreover their magazines were empty; they had to go to Dunkirk to fill up, where transports brought all the shrapnel shell that the two navies possessed. We did not open fire on Ostend, firstly to spare the civil population which was swelled by the presence of numerous refugees, and partly because it was hoped that it would soon be again in our hands. The *Crusader*, with Admiral Hood on board, put in as far as the entrance to the harbour, but only bombarded the hotel where the German staff was established. But along the coast and up to six or seven kilometres inland the shell fired from the sea did little damage to the enemy communications, and were much more effective against positions which they enfiladed or took in reverse.

The ships ran considerable risks. First and foremost they had to manœuvre amongst sand banks in spite of constant fogs, and to go in close to the shore. "If it suddenly started to blow from the North," Admiral Hood wired on October 22nd, "the monitors would be lost; but results made it worth while running that risk." The *Venerable*, which had joined the flotilla and was doing good work with her big 12-inch guns, was much interfered with by these difficulties of navigation; she was also in danger from attacks by submarines, who had missed the destroyer *Wildfire* with two torpedoes, and she had to be protected by small craft. To add to our difficulties, the German reply was not long in coming; at first field guns, then heavy guns were soon got into action in positions that could not be seen from the sea, and opened fire on everything afloat. Many ships were hit and the *Mersey*, the *Brilliant*, and the *Wildfire*, had to put back to England for repairs. Luckily the enemy as yet had no naval guns, and their shells although they caused serious losses in men, and damaged many ships, at least did not sink any. Curiously enough the French destroyers though they were constantly engaged with the British, never were hit at all.

On the 28th October, a slight contretemps occurred: the naval attaché in London wired, in accordance with instructions from the Admiralty, ". . . . French torpedo boats acting independently have been firing on the Belgian troops; it would be advisable to put all the naval forces operating along the coast under the orders of one commander, who himself should be under the commander of the land forces."

The real facts of the case were as follows: A French squadron of Chasseurs d'Afrique had had a few horses hit by chance shell on one occasion, and on that day only British torpedo boats were at sea.

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However, unity of command certainly was desirable, and the commander of the destroyers was asked to place himself under the orders of Admiral Hood. It was he who ordered the *Aventurier* and the *Intrépide* to bombard on the 29th and 30th Westende and various other targets pointed out by the British naval attaché with the Belgian Army.

On the 3rd of November the inundations of the Yser prevented once and for all the enemy in the coastal region from advancing beyond the line he had reached a fortnight before. The same day Admiral Favereau, who had just assumed command of the French naval forces of the Straits, came to inspect at Dunkirk, and with Admiral Hood, made a reconnaissance on the *Crusader* of the Belgian coast. While acknowledging the good moral effect on the army of the action of the ships along the coast, the two admirals agreed that at any rate at the present time the operations were without result, and too risky for the ships. There were now no enemy troops in the open, so that there were no definite artillery targets, and the German batteries—which could not be accurately located—were already numerous and outranged the guns carried by the torpedo boats. This being so, it seemed preferable to keep these in reserve to be used in cases of absolute necessity, i.e., to support our troops in an attack, or to protect them against an enemy advance along the coast. In the absence of Admiral Hood, who had returned to Dover on hearing of a sortie by the German Fleet, Admiral Favereau proceeded to Cassel to point out these views to General Foch. On the 7th November our ships put out to sea again to suppport an attempted advance by the French troops in front of Nieuport, then returned to Dunkirk, and Admiral Favereau returned to Cherbourg, leaving with the captain of the *Dunois* orders to give all the help he could to the army, when they demanded it, but to undergo no undue risks to the ships.

On November 20th, however, General Joffre informed the Admiralty that ". . . . for some time neither French nor English ships are co-operating with our troops about Nieuport. In view of the very heavy enemy bombardments, it would be as well if ships could engage the numerous German batteries in action E. of the Yser." Thus he demanded from the French Minister of Marine and from the British Admiralty "a more active co-operation between Nieuport and Ostend." That same day General Foch expressed a wish that the Anglo-French naval forces should on the following night make a reconnaissance of the German batteries at Middelkerque by means of a bombardment. The French torpedo boats could not do this satisfactorily, for the short range of their guns would necessitate their entering a mine-field to engage the desired objective. However, on the 21st, Admiral Hood arrived at Dunkirk with the old battleship *Revenge*, which the Admiralty had sent him, after having increased the elevation of her heavy guns. On the 22nd, he opened fire at extreme range. The German reply was immediate, and many shell fell about the *Revenge* and the French and British torpedo boats, who ran more risks than were justified by the damage they were able to do. Meanwhile the object of the operation—reconnaissance of the enemy batteries—was attained, and General Foch

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declared that for the time being action by the allied fleets was finished. But on November 29th, the commander of the destroyers was informed by Cassel that "the German artillery is nearer our line now that our ships are no more seen." Again General Trumelet-Faber, commanding the Nieuport sector wished "to see torpedo boats appear from time to time and fire a few rounds to keep the enemy alert."

Admiral Hood to whom these demands were made, stated that he considered his gunboats were not adequately armed for such operations, and that as he had no other ships available he could give no useful support. The *Revenge* on account of her deep draught could not approach the coast. Admiral Favereau, who was at Cherbourg opined that the wishes of the generals should be complied with, unless absolutely impossible, and that "consideration for the risks run by our light vessels might under the circumstances not be understood by officers of the army." He proceeded at once to Dunkirk on a passenger boat equipped as an auxiliary cruiser. After having seen General Foch at Cassel, he embarked on the *Francis Garnier* and followed by the *Intrépide* and the *Aventurier* proceeded on the night of December 1st to bombard the enemy lines; a "sprinkling" of shell not likely to produce much result. The enemy who as yet had no search-lights made no reply.

Towards December 10th we began to fear a German landing to take our line from the rear. Aeroplanes had seen numerous rafts in Ostend harbour, and observed unusual railway activity. These facts and information from British sources—which, by the bye, was to recur frequently during the next three years—announced that an enterprise of this nature was likely to occur in the near future. It appears that the Germans, who fully realised its difficulty, had never considered such an operation seriously; on the other hand, as often happens in war, they feared a similar undertaking on our part, and guarded against it by sowing mines about Nieuport, and by placing obstructions along the beach. However, that may be, the army demanded that our ships should keep a strict watch between La Panne and Nieuport. The commander of the mobile defences of Dunkirk collected in this port the small torpedo boats that he had detached to Calais, and organised night patrols in the Nieuport roadstead; in addition two destroyers were kept in the roadstead ready to put out at the first signal, when circumstances should be favourable for a landing (high tide at night, and no moon). Admiral Hood, in January, added to them two gunboats and some mine sweepers which should co-operate with ours in sweeping the mines sown by the enemy; a necessary operation, for these mines destroyed our torpedo boat No. 319, and one of our sweepers, who sank with most of their crews.

On December 15th, Admiral Hood brought to Dunkirk, two battleships, two gunboats, and six destroyers; on the 16th he bombarded Mariakerque, but when the *Revenge* had been hit below the waterline and was making water, he sent all his ships back to Dover. On the 18th, General Foch demanded immediate action against Westende; the French destroyers carried out almost daily bombard-

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ments from the 18th to the 26th, under enemy fire; but their guns, owing to the number of rounds they had fired during the last two and a half months, were badly worn and had to be sent back for repair. This deprived the army for some time of the co-operation of our ships. In the middle of January, General de Mitry, commanding the coastal sector, again begged Admiral Hood to bombard the works along the coast with his destroyers but met with a firm refusal as the admiral considered these demonstrations dangerous and useless.

The *Venerable*, however, came back twice to Dunkirk, on the receipt of information that movements of troops on a large scale had been observed near Ostend, but did not open a bombardment and returned immediately to Dover. The Navy now only kept watch over the coast.

By this time our own line was properly organized in front of the Germans, and as General Hély d'Oissel who had taken over this sector writes, the action of torpedo boats against land targets was no longer required, as the French heavy batteries in position about Nieuport could fire much more accurately on the same targets.

During all this time there was a certain amount of misunderstanding between the army and naval commanders. The former, whose task was terribly difficult and who had not the means to cope with it wanted the ships to co-operate as they had done when the enemy first got to the coast. The naval commander, however willing to co-operate, had to take into consideration the losses that he would probably incur once the Germans had organized a strong defence of the sea front from the frontier of Holland to Nieuport. He knew that ships sunk would not be replaced, for both in England and France they were short of ships; he was quite ready to act with energy if action by him was to be of real use, for instance, if to co-operate with an offensive to retake the Belgian ports; but he did not wish to risk losing ships merely to join in the daily artillery activity which would not be helped much by fire from the 4-inch guns of the torpedo boats. Still less did he wish to risk losing in this way battleships or cruisers however obsolete, as he considered that, though their loss might not be of great consequence, the moral effect would be very great. On these points French and British sailors were fully in agreement. But the advantages that would accrue from co-operation with the forces ashore was not overlooked, and with the object of assuring it the British Admiralty in November 1914, not only put in hand ships to reinforce their squadrons, but also commenced the construction of quite a fleet of monitors armed with very heavy guns.

Why, it will be said, did not the navies possess at the outbreak of war, ships capable of acting in support of the army? The reason is that ships were only made to fight one another. Their principal task is to destroy or reduce to impotence the enemy's naval forces, and they cannot undertake another task until that is done. The only reason the allied navies were able to operate against the land in Flanders, the Dardanelles, and the Adriatic, is that the enemy ships were shut up in their own ports.

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The first monitors arrived at Dover during the summer of 1915. These were ships of 6,000 to 7,000 tons, armed with a turret containing two 12-inch guns, drawing only nine feet of water which allowed them to pass over the sandbanks of Flanders as easily as torpedo boats. An outer casing rendered them almost immune from damage by mines or torpedoes; two were actually torpedoed in 1917 and were able to put into Dunkirk under their own steam. On the other hand, they were not armoured, and therefore very vulnerable from the heavy shell of the German batteries. Their engines were of low power borrowed like the turrets from obsolete ships and only gave a speed of $7\frac{1}{2}$ knots, only just sufficient in waters where currents of three knots are not unknown. Each monitor could fire one round every two minutes at a range of about 18,000 yards. Their successors that were ready by 1916 had 15-inch guns with a maximum range of 22,000 yards.

Admiral Bacon, who had succeeded Admiral Hood in the command of the Dover Patrol, used them at first to bombard the dock and naval workshops at Ostend, the mole and locks at Zeebrugge, and the German batteries along the sea; purely naval targets the destruction of which would deprive enemy submarines of their bases in Belgium. These bombardments were difficult as the superior range of the heavy guns along the shore necessitated the monitors remaining far out at sea. This involved working out special methods for indirect fire, establishing near the coast observation platforms for the control of fire (after a time aeroplanes did this more effectively), and concealing the ships behind smoke screens. As the monitors had to pass through areas where the enemy had sown mines to get to their firing positions, it was necessary to send mine sweepers on in front of them; during their crossing and whilst firing they were subject to submarine attack which made an escort of destroyers and trawlers necessary, while at the same time aeroplanes had to be in the air to drive off hostile bombardment machines; finally torpedo boats had to place buoys to mark out their route. This meant that for every two or three monitors, about a hundred ships of sorts had to be on the move, to say nothing of aeroplanes, and it must be admitted that the results of these operations were most disappointing; the locks at Zeebrugge, whose destruction would have been so advantageous to the allies were never hit; and the heavy guns of the German batteries were so well protected by their casemates of reinforced concrete that the monitors could not silence them. The superiority of forts over ships admitted throughout naval history, proved itself here as it did at the Dardanelles. It was the air service that by ceaselessly bombing Zeebrugge and Ostend, succeeded in 1917 in denying them to enemy submarines. Later the blocking of the entrances to these two ports in April and May 1918, almost entirely prevented submarines from entering or leaving them, and the great barrage of the Straits of Dover, placed an almost impenetrable obstacle between them and the allied communications. But the bombardment of the Belgian coast was not only intended to harass the submarines. The British High Command, both naval and military, had another purpose in view; that was to retake these ports.

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They had commenced considering the matter from the moment when the Germans had occupied them. About the latter end of 1914 the British Admiralty had worked out from the naval point of view, a scheme for a combined attack, of which General French had at once approved; The British realised the facilities the possession of bases so near the Straits gave the enemy for threatening the transports. Although at this time they did not foresee the development to be reached by submarine warfare, yet they rightly anticipated action that might seriously compromise their communication with the continent; for the Germans at Ostend and Zeebrugge were favourably situated to launch destroyer attacks even more dangerous than those by submarines on the vast numbers of ships that were crossing the channel or were lying in the roadsteads. In addition the British statesmen viewed with great uneasiness the possibility of peace being declared before the Germans had been driven out of Belgium. So they often tried to impress on the French High Command the need for an offensive in the coastal region, strongly supported by the action of their navy. In France, however, the opinion was that the very great effort necessitated by such an enterprise would give better results in a more central part of the front.

At the end of 1915, Admiral Bacon produced a new scheme, which was to make use of the monitors to land three divisions at Ostend, who should seize the town and the batteries in the vicinity and then march south in co-operation with British troops moving north from Ypres, supported by a French attack from Nieuport. But British G.H.Q. would not accept this plan as they considered that the front where the landing was to take place was too narrow and that German reinforcements would have time to intervene before the batteries were taken. Moreover, while this plan was being discussed, the enemy installed near Zeebrugge a new 12-inch battery which could fire accurately on the entrance to Ostend; this fact alone at a time when there was no means of producing a smoke screen made the operation impossible.

In the beginning of 1917 when the means existed for producing smoke, Admiral Bacon proposed a new scheme which was an improvement on this. This time he did not propose landing more than one division, but on a front of three kilometres between Westende and Middelkerque. The landing would be difficult; there was all along the coast a wall thirty feet high, inclined at 30° and crowned by a rampart one yard thick protected by numerous machine guns to say nothing of artillery; the gentle and almost regular slope of the shore prevented ordinary ships from getting alongside, and it was too high an obstacle to be climbed by men landed from boats. Admiral Bacon proposed defeating this by constructing three huge pontoons 600 feet long by 30 wide, with a draught decreasing from nine feet at the stern to under a foot where the front should lie on the sand. Each of these pontoons, which had a 2,500 ton displacement was to be fixed between two monitors and pushed ashore by them. This would make it comparatively easy at high tide to pass ashore from the monitors the men and material which included tanks. The Admiralty were in favour of this plan and Sir D. Haig agreed with

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only one condition, which was that the landing should not be attempted until an attack from the Ypres sector had reached Roulers and was threatening Thourout. The British High Command thought they could obtain this result in the summer of 1917. They therefore commenced a long and careful preparation. The monitors (in the Thames), and a division of Rawlinson's at Clipon near Dunkirk were trained for several months. The greatest precautions were taken to keep the operation secret, so that it should come as a surprise. Success seemed possible. But first ground had to be made in Flanders. In the beginning of July, the 4th British Army relieved Nollet's division on the Nieuport—Dixmude front; General Anthoine's army prolonged it to the right; next came Belgians, then the British troops on the Ypres front under Plumer. The preparation had a bad set back at the start; on the night of 10—11 July, the enemy took the bridge heads at the mouth of the Yser, which greatly interfered with the "jumping-off place" of the projected offensive. Nevertheless the attack commenced; bad weather went against it; the long preparation had given the Germans plenty of time to be ready for it; August, then September slipped by before the armies had gained anything like the amount of ground necessary before the landing should be attempted. The days were becoming short and things were not going well. By the middle of October, the British in spite of the heavy sacrifices they had made, barely had got the high ground overlooking the plain of Roulers. The attack had to be abandoned. After being shut up for three months the monitors returned to Dover, the 1st Division left Clipon; the naval plan was given up. Six months afterwards the blocking of Zeebrugge and Ostend was an acknowledgement of the impossibility of retaking the Belgian coast, which was eventually to be evacuated in October 1918, as the result of the general offensive of the armies.

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It was by day—at sunrise—that the British proposed landing near Ostend. It was by night, on the other hand, that we expected to see the Germans try to cut in behind our front. The reason is this: a raid rather than an expedition was more to be expected; by day the allied squadrons based on Dunkirk could easily have stopped enemy ships of which there were not enough in the Belgian ports to cover a landing. Yet we were uneasy at seeing an increase to the number of destroyers kept there. From five or six in October 1915, the number had risen to twelve by the beginning of 1916, and we wondered what their role was to be. At the same time the air reported the presence at Zeebrugge and Ostend of numbers of barges assembled in the canals, and of monitors similar to the British ones with a tripod mast for observing fire. The real reason for the presence of the barges was the use the Germans made of the water ways; there never were any monitors—aviators had no doubt mistaken dredgers for them. However, precautions had to be taken.

On February 24th, 1916, a conference was held at G.H.Q., at which Generals Joffre and Foch, the Naval ministers, and Admiral

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Ronarc'h and Marliave were present. It was decided to complete the defence of the coast between la Panne and Oost—Dunkerque by planting stakes in the sand to prevent the grounding of barges, and by installing electrically fired mines that could be exploded at will. The Coast Guard service was reinforced, as also was the sea patrol. The latter was to send warning signals by wireless, upon which the navy would at once inform the G.O.C. the coastal sector. Besides this, the British provided a monitor which with three or four English or French destroyers lay every night off la Panne, ready for action. Although the enemy must have been aware of the presence of these ships, they were never attacked even by a submarine: "to the shame of the German Navy" as Admiral Bacon says in his memoirs.

When two months later the command of our naval forces in the Straits and in the North Sea was given to Admiral Ronarc'h under the title of "Naval Commander-in-chief in the Northern army area," the importance he attributed to co-operation with the army is to be noted; the following is an extract from his instructions: . . . .

" (3) Our naval forces are to act in close liaison with the troops operating in Flanders, so as to guarantee them immunity from surprise from the sea, and to help them should occasion arise in an advance." Admiral Ronarc'h was quite aware that the force under him neither possessed the quality nor the quantity to be able to cope with its task. However, neither the French nor the British navies could afford much in the way of reinforcements to their forces in this zone, as the development of submarine warfare was keeping them fully occupied elsewhere. "Actually," said the admiral, "the Nieuport front was the real, if not the only protection to naval bases of Dunkirk, Calais, and Boulogne."

The Germans could easily have brought to the Belgians ports a flotilla strong enough to dominate the allies in this area. That they did not do so is perhaps because they did not think it advisable in view of the fact that their main use of these ports was as submarine bases; perhaps also they wanted to keep their destroyers intact as auxiliaries to their battleships in the event, however improbable, of a battle with the British Grand Fleet. Anyway they made little use of their destroyers. In fact the only use they made of them was bombarding the nearest allied ports; useless operations, as firing several hundred small shell at great range by night at a town could not do any considerable damage to material; but the enemy relied on a moral effect, and were able to write boastful communiqués about them. "It is always difficult," wrote Admiral Bacon, "to prevent a raid even when you have warning. Anybody can come round the corner in a street, throw a stone and run away. The point is whether breaking a window is worth the risk of being caught by a policeman and whether or not the window is open and can be broken." Admiral Bacon was alluding to the first German destroyer raid, which was the boldest; during the night of October 26—27, they reached the middle of the Straits of Dover, torpedoed an English destroyer, sank an empty passenger boat and one of our patrol trawlers without loss. They had all the advantage acting on the offensive, whereas our ships were operating in a very wide zone where they could not pro-

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tect everything, and had besides at night great difficulty in differentiating between friend and foe before opening fire; on February 25th 1917, the enemy bombarded Broadstairs; on March 17th they attacked Ramsgate and sank an English destroyer; on March 25th, they fired about sixty rounds at Dunkirk; on April 20th, they bombarded Dover and Calais; but this time the "policeman" intervened; two small British cruisers sighted them, and sank two whereupon the others although numerically superior made off, as they invariably did in such cases.

During the night of April 24th—25th 1917, the Germans brought off another success: they bombarded Dunkirk for four minutes and sank our destroyer *Etendard*, surprised at her post of guardship before she could get into action to defend herself. But on May 20th, energetic action by our ships took place in time; the *Bouclier* was damaged, lost her captain and second in command, but was able to continue fighting; the enemy who had counted on bombarding Dunkirk had to give it up, and as usual, retired at great speed. They did not come again till October 18th, when they succeeded in torpedoing a monitor lying in the roadstead and in firing a few rounds at the harbour. That was the last time that they got away without casualty. On March 21st, 1918, fifteen destroyers bombarded Dunkirk, and that area for ten minutes; but the Franco-British watching ships, five in number, succeeded in cutting off their line of retreat; two German torpedo boats were sunk and enemy raiding squadrons did not appear again. The principal result that they had obtained was to force us to keep ships as port guardships, which would have been more usefully employed in searching for submarines. It was the business of shore defences to repel attacks on the towns along the coast, and the presence of allied ships in their field of fire often prevented them from acting. "But, as Admiral Ronarc'h stated in a report, public opinion could not understand why torpedo boats based on Dunkirk should do anything except protect Dunkirk, and we had to defer to it."

The naval air service co-operated in the defence of the port, both by fighting the enemy fighters and observation machines, and by bombing the German aerodromes. But that was hardly naval co-operation; the naval flights were making good in the common interest the deficiencies in the army air service which already had too much to do.

The blocking of Zeebrugge and Ostend had coincided with the check of the German offensive in Flanders; it was not improbable that the enemy might attempt a similar enterprise against our ports—particularly against Dunkirk. We had along our coast only about a tenth of the number of guns mounted along the Belgian coast. Besides our situation from a defence point of view was made much more complicated by the number of ships both naval and mercantile that sailed about by day and night in our zone. A determined crew could have brought a ship and sunk it in the fairway at Dunkirk far more easily than the British did in the Belgian ports. It was necessary to take precautions against such an enterprise which would have deprived the allied armies of one of their most useful supply bases. These

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precautions consisted of extinguishing all the lights along the coast, reinforcing the defences of the sea front, telling off certain guns to fire on blockships, keeping a monitor lying off the entrance to the port, and sending out strong patrols on dark nights. But the enemy did not give us the opportuity of testing the efficiency of these steps. Almost deprived of the use of the Belgian ports, demoralised by his losses in submarines and by the check to the war on ships of commerce, the enemy almost ceased all naval action. And when the great allied offensive was extended northwards by the attack on Roulers, which commenced on September 29th, he at once commenced his preparations for the evacuation of the coast. The last torpedo boats and aircraft left Zeebrugge and Bruges on October 2nd. But the batteries still replied on October 14th to the fire of the monitors that were bombarding them, and at the last moment the Germans blew them up one by one. On the 17th, the allied ships entered Ostend, and on the 19th Zeebrugge, just in front of the Franco-Belgian advanced guards.

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So the effective co-operation between the navy and the army in this zone where both were in contact with the enemy was confined to artillery fire during the period before the front became stabilised, then the defence of Dunkirk and the safeguarding of the coast. At the commencement it was as in former wars more or less improvised; finally it became organised and the soldiers and sailors worked in close touch with one another and were ready to make joint use of all their weapons. But this entente was due to the good will of the commanders—particularly to the admiral who formerly had commanded the naval brigade—rather than to previous preparation. Now such preparation is necessary and very easily arranged. By creating commands of maritime frontiers, with their staffs, where military and naval officers work together, it should be quite easy to impart to all a much deeper knowledge of the requirements of both services, and would lead to much more efficient use of the two when combined.

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ON WRITING FOR PUBLICATION.

By Major-General Sir C. E. Callwell, K.C.B.

IN view of the important modifications that are being introduced in respect to "The Journal of the Royal Artillery," it has occurred to me that a few notes concerned with the practice of authorship in various forms may be of some interest to contributors, or potential contributors, to our Regimental periodical. As some excuse for expatiating on a subject which necessarily admits of considerable differences of opinion, I can claim to possess a fairly wide experience in the matter of writing for publication, an experience which extends over more than forty years. A few early efforts in the "Proceedings of the R.A.I." served for a start. Five years passed in the old Intelligence Department of the "eighties" and the early "nineties," at a juncture when that institution still remained in a somewhat embryonic condition, connoted an output of hundreds of thousands of words embraced in military and topographical reports all of which had to be passed as sound by an experienced and severe critic, that very distinguished Gunner the late Sir Henry Brackenbury. Two or three more or less professional volumes off one's own bat widened literary outlook. Then again, editors of leading magazines and reviews are always disposed to welcome articles from soldiers. And for some years after retiring from the service I was mainly engaged upon journalism.

Now, there is one thing that any Gunner officer who feels that he possesses a bent for writing can feel sure of, unless he be endowed with a natural genius for the job. He will improve with practice—at least at the outset—and he will speedily acquire the requisite technique with regard to various minor points, of no great importance perhaps but nevertheless worthy of some attention. Take, for instance, the question of paragraphs. People who are making a start in writing are generally inclined to make their paragraphs

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too short, which looks bad. You will find that accepted masters of prose—Macaulay, say, Hallam, Mahan, Henderson—seldom give you a paragraph comprising less than four sentences and generally give you considerably more. That beginners are so disposed to cut up their work into short paragraphs is no doubt in a measure due to the simple fact that handwriting relatively takes up more space on paper than does type. Your paragraph looks all right in M.S; only when it appears in print does it look mean and truncated. Needless to say there can be no golden rule on the subject; a crisp paragraph of a sentence or two when you are off on a new tack will often be most effective; a succession of paragraphs each of them covering a whole page are apt to produce the impression that your output is more stodgy than it actually is.

Then there is that very awkward problem of punctuation. You can trust the compositor to put your spelling right if that happens to be shaky, but at punctuation he is a terror. If he can contrive to insert a comma at a spot where it makes the sentence wholly unintelligible he will do so without pity and without remorse, and he absolutely refuses to be guided by what he sees written down, be it right or be it wrong. Elaborate works on punctuation probably exist, there may be shelves full of volumes on this exhilarating subject in the British Museum Library; but the broad rule to be guided by in respect to commas seems to be that their employment is more honoured in the breach than in the observance. Fewest used soonest mended. Full stops on the other hand are perhaps scarcely employed enough by inexperienced writers; in other words, these are inclined to make their sentences too long. In nine cases out of ten the result will read better if you split a long sentence in two—as is almost always feasible at the cost of some slight alteration in the wording.

Seeing that editors nowadays generally expect any M.S. sent in to them to be type-written, it is advisable for any new hand who contemplates writing for publication to any large extent to fit himself out with a typewriting machine. You can type far faster than you can write after a little practice, and although you probably will always think faster than you can type your hand will make a better race of it with your brain when using the machine than when using the pen. Typing moreover is far less tiring to the hand for the

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same amount of output produced than is writing. Most authors are probably often dissatisfied with some of their work and find that whole sheets require copying out afresh, and this copying business is incomparably less trouble when it is a case of typing than when it is a case of pen and ink. Many authors moreover are probably in the habit of making rough drafts of what they propose to say and of then polishing the drafts up with corrections, interlineations, and so on. It is much easier to do this polishing if the draft be type-written than if it be written with pen and ink, and it will sometimes be found that the corrected draft is so readily legible that there is no need to resort to a fresh copy. From the point of view of the serving soldier type-writing machines no doubt have a serious objection in that, if of the best kind, they are cumbersome contrivances to drag about the world with you. But they are a tremendous help.

To pass on from these preliminary points:—A few suggestions with regard to authorship in connection with military, professional subjects will not perhaps be out of place, and I would lead off with a dictum—whatever you do don't be didactic, and if you can manage it don't be dull. The General Staff, it is true, are prone to be didactic; but then that body—in theory at least—claim to express a consensus of opinion entertained by acknowledged experts; so one must leave it at that. The most confidently entertained views can moreover be expressed without their exponent being exasperatingly pontifical, and those views can be bolstered up by argument without wholly ignoring the arguments available on the other side. It is difficult no doubt to avoid a certain prosiness in dissertations on tactics, or defence-works, or the handling of artillery in the field, or technicalities of manufacturing war-material, or analogous subjects; but the introduction of a racy metaphor or of an apposite anecdote may do wonders towards making the treatise endurable to the earnest student and even to the ordinary reader.

One very important point in connection with writing on professional subjects is the question of maps, plans, and so forth, and a word of warning in regard to this seems to be called for. The author should always bear in mind that such adjuncts, however necessary or desirable they may be, are apt to add very appreciably to the cost of production. The ordinary publisher is wont to view

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the matter from a somewhat different stand-point than will, let us say, the R.A. Institution with its comprehensive lithographic and other plant, or will the War Office. The War Office is indeed from the business point of view a particularly bad school to be brought up in in this connection. There is no boggling in Whitehall over the number, scale, scope, and so forth of the maps with which the official producer of the M.S. proposes to illuminate his effort; an admirably equipped cartographic department exists within the precincts and, when all is said and done, the public are paying so why should one cut the adjuncts down? But that sort of thing is apt to evolve bad habits.

Maps of course stand on a somewhat different footing from diagrams of objects such, say, as a fuze. Nobody can be expected to understand the mechanism of a fuze from a mere description, no matter how lucid and comprehensive; there must be an elaborate diagram, larger than life, a riot of colour and with no give and take about it, to make the thing intelligible. But quite a simple map, strategical or tactical, will often serve the purpose when treating of operations in the field, provided that a little discretion has been exercised in respect to mentioning names in the text. The broad principle that in a serious military work every place referred to in the text should be shown on some map is a generally accepted one, so it becomes a question of restricting the number of names mentioned in so far as is practicable without damaging the narrative. If this point be borne in mind it may even become feasible to eliminate altogether that folded horror which insists on unfurling itself with a flop when it is not wanted, which cannot be induced to fit back into its place at any price, and which is in tatters before the reader has waded half way through the volume. Suppose, for instance, that you are telling the story of a campaign in which one army is advancing into the West Country from London. "The main body halted at Richmond, but the advanced guard pushed on in the evening as far as Twickenham." But why drag in Twickenham? "The advanced guard pushed on another couple of miles in the evening" is all that is necessary and it saves the insertion of a long name on the map which will be very difficult to fit in unless the map is on a huge scale (one is assuming of course that the enemy is not near at hand).

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When it is a case of submitting the M.S. of a book as ready to go to press, it is a wise precaution to go through it very carefully beforehand so as to make sure that there will be a very minimum of corrections and alterations necessary when the proof comes to hand. I have never been able to understand how it is that corrections or alterations or insertions after a M.S. has been set up in type involve such fabulous sums, as compared to what the original setting-up has cost. I know of a case where the printing and paper absorbed in 1500 copies of a book consisting of about 300 pages ran to £285, where an additional paragraph and one or two additional sentences were inserted in the proof and where a very few quite minor corrections were made, and where the charge for these insertions and corrections came to over £35! The point is one of some practical interest to intending writers, be it noted, because in ordinary circumstances the author finds himself charged for the insertions and corrections. That whatever they cost (or are said to cost) is docked off his receipts when the account comes to hand from the publisher, is indeed a common source of complaint on the part of the *littérateur*. Working in the War Office, it may be mentioned (or, for the matter of that, working in any Department of State) is apt to provide dangerous training in this connection. You cut up your stuff while it is in proof with a merciless hand in the purlieus of Whitehall. "Oh, we'll get the confounded thing printed and will then put it right" may be said to represent a not uncommon procedure in the War Office, but the adoption of methods such as these would land you in the work-house were you to try them on with a normal publisher.

There was a practice in old days in the Intelligence Department of producing comprehensive compilations concerning foreign armies, and they went by the name of "Armed Strengths." I once prepared one of these monumental works that treated of the military forces of Austria-Hungary, and in due course sent off the mass of manuscript through the proper channel to the Stationery Department to be printed. When the thing came back in proof form it was observed that the compositor, or compositors, had deliberately and without the slightest excuse or justification set up every title or military expression with the first letter of the word in capitals, many such words occurring over and over again sometimes on a

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single page. Lieutenant, medical officer, field-rabbi (they used to harbour this particular form of militant divine in the Dual Monarchy), corporal, pioneer, brigade, company, section, pontoon-train —all were the same, all printed leading off with the capital letter. Indignant at the outrage, I corrected every one of them at considerable trouble, substituting small letters, and sent the proof back. A protracted correspondence ensued with the civil side of the War Office. Its minions represented that all these corrections would mean an appreciable expenditure of money. I retorted that this would teach the Stationery Department not to play the fool another time. The usual pat-ball game of minutes backwards and forwards ensued but was brought to an end by a felon stroke delivered by a big-wig on the civil side. "Is it to be understood" demanded he "that the work is of such far-reaching importance that it really matters whether these words are printed with capitals or not?" To this query there was no effective rejoinder handy, so the military side had to haul its colours down, worsted in the encounter.

Proof-reading is always a weariness of the flesh, and to carry it out effectually is not an art that can be acquired; it comes natural to some people, others will never get the knack of it however much practising it may fall to their lot. Most printing institutions appear to maintain experts who run through the galley-proofs as they are struck off and who seldom overlook a mistake in spelling or miss a letter that has been inserted upside-down; were it not for this one would be passing text for press full of errors. I well remember going round Messrs. Blackwood's establishment in Edinburgh with the late Mr. William Blackwood one day a good many years ago; they do their own printing and all the rest of it, differing in this from a good many of the publishing firms. It was all very instructive and interesting; but what impressed me most in the place was a female creature of about fifteen with an aggressive pig-tail—one would gladly have parted with five shillings to be allowed to box the little brute's ears—perched on a high stool with a galley-proof in front of her. She was gabbling away in a squeaky monotone, regardless of stops, without the slightest idea of what she was reading about and occasionally coming a regular cropper when she found herself up against an uncommon word, to a Weary-Willy sort of body who had what was presumably a corresponding

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proof in front of him. How her infuriating piping could be of any assistance to the man was hard to understand, but it presumably helped him in some mysterious fashion.

Writing for publication, the trade of literature if one may call it so, may be said to divide itself broadly into three big branches—(1) contributions to periodicals, (2) writing books, (3) journalism. Some of those who take to, or who dabble in, authorship no doubt do so purely from high motives, or because they are nourishing some pet theory of their own and desire to expound it, or merely for the sake of occupation in hours that otherwise might be spent in idleness. But others, possibly the majority, are at least to some extent actuated by sordid motives. They want to make a bit, and, as one who confesses himself to be enrolled in this latter class, my experiences in the matter may be of some interest to others included in the same category. There is a certain satisfaction that is not wholly rapacious in raking the shekels in for work actually performed, as compared to acquiring those exiguous sums that are paid into one's account with Messrs. Cox & Co. quarterly by a beneficent Paymaster-General. For the past fifteen years (very lean years during the days of the War) I have kept careful account of receipts for literary output of all kinds falling to my share, and the statistics work out approximately as follows :—14 per cent. has come in from contributions to periodicals, 19 per cent. has come in from books, 65 per cent. has come in from journalism. The remaining 2 per cent. has been represented by operations that do not exactly come under any one of the three headings, neither fish nor fowl nor good red herring, such as articles in the "Encyclopædia Britannica." In other words, journalism would seem to have paid decidedly the best, and this in spite of the fact that since the War I have done comparatively little in that direction, which has tended to bring its percentage down.

Now, to take contributions to periodicals first, seeing that work of this kind serves to introduce so many soldiers into the world of letters. One great advantage about such undertakings is that you know where you are. You offer to write an article for, say, "The Wise Man's Review." Well, the editor tells you politely to go to blazes, or else he writes that he will consider your effort when he gets it, or else, if he be a real sportsman, he replies "Right you are !

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Let me have it for next month's issue. Make it about 5,000 words, but I might manage 6,000." Whatever happens, you can assume that you will get something like a guinea a page for what is accepted, unless you happen to be an ex-Lord Chancellor or a leading jockey or a professional beauty in which case you will get a fat bonus over and above normal rates. Still, if this form of literary activity can be classed as encouraging in its financial aspects, it also labours under certain drawbacks. The difficulty of finding subjects to write about of a suitable character arises, and when contributing to periodicals of any sort of standing it is imperative to know what you are talking about, except of course when meting out fiction. You may manage to impose upon the editor of a newspaper, and you can easily gammon its readers for they will believe anything; but you cannot bluff the editor of one of those ponderous monthly or quarterly reviews that they take in in clubs, nor can you dupe the kind of people who wade through such pages.

Turning from the question of contributing to periodicals to that of writing books, we find that the latter form of literary activity stands on quite a different footing from the former. Books are, speaking of course generally, a gamble, and they are a gamble not merely from the point of view of the author but also from the point of view of the publisher. Everybody has heard those stories of works which have, after they eventually saw the light, come to be looked upon as masterpieces but which, at the time when they were served up by their authors, were hawked about by these from pillar to post and were finally parted with to some publisher (who was by no means sure that he had made a good bargain) for a mere song. The fact is that, with all their experience, publishers to some extent resemble the theatrical manager who never can make sure whether a new play which he is about to put on is, or is not, going to be a financial success. A book which may look as if it ought to sell like hot cakes may not sell at all, or at all events may not sell in sufficient quantities to make it a paying proposition, and the publisher has to stand the racket supposing that the venture proves a complete failure and he is left with piles of unsaleable copies on his hands. These observations no doubt hardly apply to the volume which is produced by a popular author of established reputation, because even a bad book emanating from such a source is sure to command

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a fair sale. But writers in the bulk are not "popular" and have little or no reputation.

The financial success, or otherwise, of a book depends, as will readily be understood, upon the number of copies sold, and it may be worth while to go into this aspect of the matter a little further. It should be understood in the first place that, in the case of most of those works that appear from week to week, the sale is not large. I should doubt whether, were the statistics to be worked out, it would be found that the average sale of all the volumes produced in a single year came to 700 copies—and this in spite of the fact that certain works such, for instance, as Mr. Churchill's "The World Crisis" or a novel by Mr. A. S. M. Hutchinson will sell in thousands and thereby raise the general average. Now, you may take it that until about 400 copies of a new work have been sold (400 is a conservative estimate, 500 would perhaps be nearer the mark, but we will call it 400) there can be no profit. That this is so is due to certain initial charges. There is, to start with, the setting up in type to be paid for and there is also the cost of the blocks if there be illustrations. Then there is the expense involved in advertisement in various forms. There is furthermore the dead loss arising from sending copies to the press for review, from complimentary copies to the author, and so forth. But once those initial charges are got rid of there is for practical purposes nothing on the debit side of the account except the cost of the paper, the cost of striking off copies and the cost of binding.

The above however leaves the arrangements as between the author and the publisher entirely out of account. Sometimes the publisher pays the author a sum of money down, sometimes it is a case of royalties, sometimes it is a case partly of money down and partly of royalties, sometimes, again, the agreement is one of half-profits as between publisher and author. If it be a case of money down when only 400 copies, or less, are in fact sold, the publisher obviously is out of pocket by that amount; he will indeed have to sell a sufficient number of copies over and above the 400 to meet this charge before he begins to make any profit himself. The arrangement as regards royalties usually is that the rate paid to the author rises after a given number of copies are sold. The agreement for instance may run that he gets nothing until the first 500

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copies have been got off the publisher's hands, that he receives a ten per cent. royalty for the next 500, and that he is entitled to 15 per cent. for all that may be sold subsequently to that—not a very liberal contract from the author's point of view. Or the arrangement may be that the author receives a royalty of 15 per cent. for the first 1,000, and that he earns 20 per cent. subsequently—which sounds decidedly more promising. The agreements necessarily vary.

But whatever the terms of the bond entered into between publisher and author may come to be, the latter seldom can tell what he will be offered when he fires his M.S. in. Moreover, after he has accepted an offer, he can seldom form a correct estimate of what he will actually get, unless the arrangement be one of money down and no question of royalty. The half-profits plan no doubt sounds attractive, but there is a fly in the ointment; supposing, for instance, that the publisher has miscalculated the number of copies that will "go" and has printed and bound some hundreds too many, the author suffers for the error just as the publisher does so long as there is any profit at all. It is because there are so many factors entering into the problem, that many experienced writers find it expedient to employ the agent (who is an expert in bargaining and who understands the business side of book-production), although this of course means that the writer loses that percentage of what the publisher pays which goes to the agent.

In journalism there is much less of the above uncertainty in regard to returns. It is safe to say that in quite nine cases out of ten the pay for a given number of words will work out at a more satisfactory figure when you are writing for the Press than when you are producing books, and you moreover often know for certain, and you almost always know approximately, what you are going to make. Needless to say the amount paid out to you varies according to the newspaper. Gazettes with a large and profitable circulation can afford to pay, and generally do pay, at a higher rate than those which are less successful. But it is quite a mistake to suppose that you may not sometimes do pretty well even when contributing to unfashionable journals. Once, for an article of modest proportions which did not take an hour to write appearing in what most military men would call an obscure paper, "The Sunday

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Something-or-Other," I netted more by some shillings than John Milton scraped up over "Paradise Lost." But the experiences of various writers naturally are not always the same, and one can readily imagine authors of the foremost rank, like Mr. Rudyard Kipling or Sir A. Conan-Doyle, finding book-production or contributing to periodicals more remunerative than journalism, in spite of their getting fancy prices for the latter.

The serving soldier is of course debarred from indulging in journalism on any extensive scale; the very appropriate and wholly necessary provisions on the subject that are set out in "King's Regulations" stand in the way. As a rule there is not the time available to send articles intended for dailies, and there is scarcely the time available to send articles intended for weeklies, to the War Office to be vetted. Take the case of reporting on manœuvres that are taking place in this country, a task for which the serving soldier —up to date as he is, or ought to be—may be particularly well fitted if he be wide-awake. The correspondent charged with this job is working under high pressure and could not possibly stop to submit what he incubates to anybody. When he gets back to his hotel of an afternoon he has to set to and write like mad so that his stuff can be telegraphed off reasonably early in the evening. It is a regular rush. Local post offices are, it is true, very helpful on these hectic occasions; they will even by arrangement send a messenger to your room to wait for copy. But no boy, least of all a telegraph boy, can keep still for one single instant. Commanded to stop over by the door and to keep quiet, he scrapes his feet, he snuffles, he gets on your nerves, and he effectually chokes up your fountains of epigram. "King's Regulations" somehow do not fit in with such conditions. But there is nothing to prevent a serving soldier from representing some one of our dailies at foreign manœuvres, because in that case his articles need not be sent in instantly. One time during the last decade of last century Henderson, author of "Stonewall Jackson," was, more or less at the request of the War Office, sent over to the German manœuvres as representing the "Times" · and there probably have been similar cases since.

Journalism naturally takes all manner of forms. You may find yourself reviewing books, which offers the advantage that you usually get the book to keep. You may be narrating stirring events,

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or you may be gushing about scenery, or you may be trying to describe inventions so that ordinary people can understand their nature. You may be plunging into political controversy, or you may be expatiating upon sport in its various branches. You will not, it is to be hoped, be concerning yourself with the details of murders and like horrors, which so many ghouls of editors and newspaper proprietors unfortunately jump at to fill their columns, degrading the Press as a whole by their conduct. You may even be writing the obituary notice of a friend who is alive and kicking, which will be stuffed away in a pigeon-hole to be fished out when its subject is gathered to his fathers. But whatever the form may be, you are paid and generally well paid, the figure being dependent upon the length of your contribution and the transaction as a whole being carried out on sound business principles.

But in appraising from the point of view of profit the relative merits of contributing to periodicals, of writing books, and of engaging in journalism, this always remains to be said. The most promising road leading to success starts from the book, no matter what it is about, which has attracted public attention. The author of such a volume should find the way smooth and gradients gentle when he endeavours to establish relations whether with controllers of reviews, or with editors of newspapers, or with the race of publishers in the bulk.

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ASTOR LENOX AND
TILDEN FOUNDATIONS

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SKETCH MAP OF N.W. FRONTIER OF INDIA

SCALE 1 INCH = 60 MILES

HERAT
HARI RUD
FAZAH
PERSIA
SEISTAN
AFGHANISTAN
(A MASS OF MOUNTAINS)
MAIWAND
KANDAHAR
AFGHAN BORDER
CHAMAN
PISHEEN
QUETTA
ZHOB R.
FORT SANDEMAN
BALUCH TRIBES
DERA GHAZI KHAN
DUZD-AB
MIRJAWA
NUSHKI
MASTANG
SIBI
TRIBAL BALUCHISTAN
KACH GANDAVA
OLD ADMINISTRATIVE BORDER
SUKKUR
FROM KARACHI
HYDERABAD
GHUZNI
AHMED KHEL
KABUL
LANDI KOTAL
AFRIDIS
JAMRUD
THALL
KOHAT
PESHAWUR
MOHMANDS
SWATIS
DARGAI
MARDAN
ATTOCK
TO CHITRAL
R. INDUS
KASHMIR
BLACK MOUNTAIN
ABBOTTABAD
GOLRA
RAWAL PINDI
HASSANGAZI
LALA MUSA
WAZIRABAD
BANNU
KALABAGH
R. TOCHI
WAZIRISTAN
KHARGI
TANK
GOMAL R.
SHARAN TRIBES
DERA ISMAIL KHAN
R. JHELUM
CHAJ DOAB
R. CHENAB
REJH DOAB
R. RAVI
TO DELHI
LAHORE
RAEWIND
TO DELHI
KANEWAL
TO DELHI
MOOLTAN
SHERSHAH
SAMASATA
THE PANJNAD
R. INDUS

RAILWAY NOTES

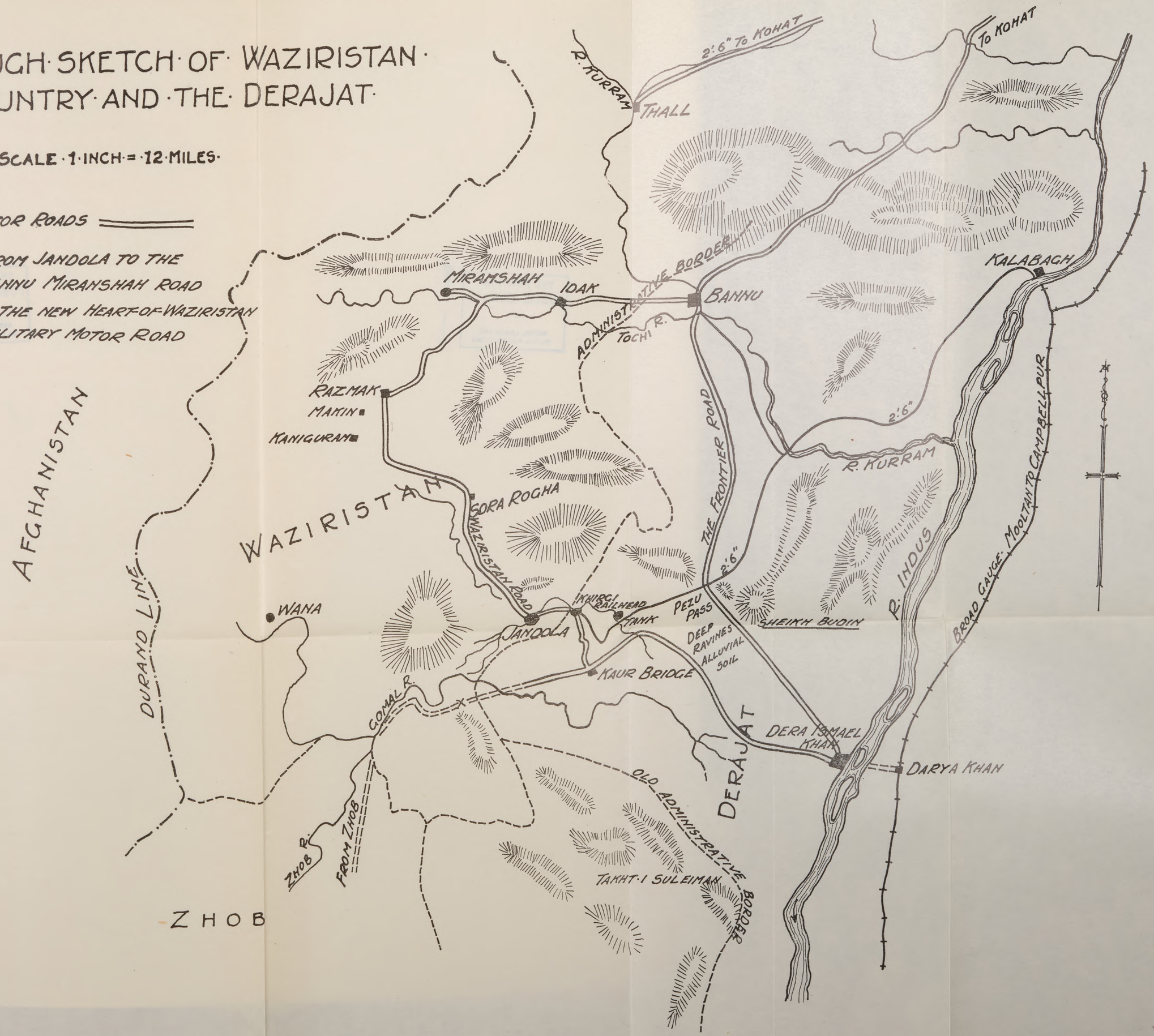
(i) THE LINES ARE ALL 5'6" EXCEPT
(a) KOHAT-THALL 2'6".
(b) KALABAGH-BANNU-TANK 2'6".
(ii) THE LINE JAMRUD TO LANDI-KOTAL IS NOT YET OPEN.
(iii) THE VARIOUS CANAL COLONY LINES RUNNING S.E. FROM LALA MUSA AND WAZIRABAD ARE NOT SHEWN.
(iv) THE NUSHKI DUZD-AB LINE WAS MADE FOR THE N.E. PERSIAN OPERATIONS IN THE GREAT WAR ITS FUTURE IS UNCERTAIN.

ROUGH SKETCH OF WAZIRISTAN COUNTRY AND THE DERAJAT

SCALE 1 INCH = 12 MILES

MOTOR ROADS

NOTE. FROM JANDOLA TO THE BANNU MIRANSHAH ROAD IS THE NEW HEART-OF-WAZIRISTAN MILITARY MOTOR ROAD



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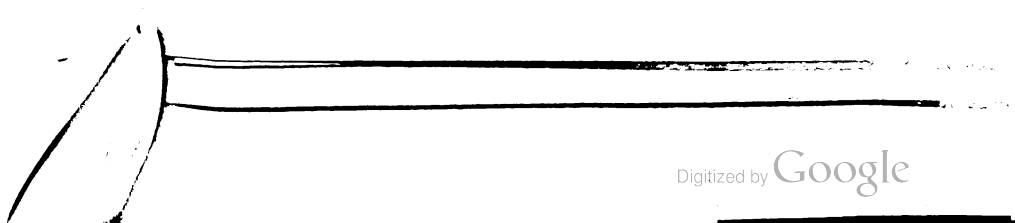

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THE NORTH-WESTERN FRONTIER OF INDIA TO-DAY.

By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O.

1. Ancient times to the arrival of the British.
2. The British period.
3. The actual frontier.
4. The tribal policy question.
5. Lord Curzon's Policy.
6. The Militia System.
7. The Great War.
8. The present situation.
9. The main frontier.

With two sketch maps :—

I. The Frontier. 1″ = 60 miles.
II. The Waziristan Border. 1″ = 12 miles.

1. Ancient times to the arrival of the British.

THERE has been some discussion and interest aroused in the policy of the North-Western Frontier in India by recent allusions thereto and criticism thereon in a recent publication by Colonel Repington. It is a very large question which has gone thro' many phases in the last eighty years, nay in the last two thousand years. Officers will hear a good deal about it in their service, and I will try and put the whole story before them in all its storied past, and actual present.

The problem of mountaineers exists all the world over. In the Pyrrennees, in the Balkans, in the Tyrol, in Kurdistan and in our own Highlands of Scotland. Mountains breed magnificent men, but they feed very few. Mountains difficult of access, are apart from the progress of the world. Their inaccessibility means that trade routes either leave them alone or pass hurriedly through them, caravans and road turning neither to the right nor to the left. But

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highlanders must live, and their corn producing fields lie few and terraced with difficulty. So the highlander throughout the world's history has had to find his food elsewhere, and since he is hardy and active, he usually gets it at the expense of his neighbours. As Falstaff kindly puts it "Young men must live, and gorbellied knaves with fat purses are fair game." That is the real story of the mountaineer from the Pyrrennees and the Balkans round to Waziristan and the Khyber.

Administration that is wise and efficient and has the money to spare, tries to provide a better livelihood for its mountaineer neighbours than can be made from cutting throats and purses. Often it succeeds as in the days of Marshall Wade when the soldier and the administration both wanted roads, and when later, crofters who could not live by land and were forbade to plunder, were taken by kindly force to more hospitable lands.

The story of our own dealings with the Afghan highlanders and our own tribal neighbours first began with the events and policy that led up to the first Afghan War. That policy was the direct outcome of the ideas set afoot by the Emperor Napoleon who planned alliance with the Tsar, and the joint invasion of India by land. He frightened the Government of India badly and not without some cause. But before we probe that story let us turn back the pages of history further, a long way further.

If you ride along the old administrative border of the Punjab, with the power that is given at birth "to stare at a rainbow, bird or tree," you will notice that very adjacent to the existing fortified posts of the Border Police, there stands an old grey mound. If you have time to stray awhile around it, you will turn up with your foot ancient pottery and bricks, and perhaps a bit of a pillar with acanthus leaves in relief. You are walking where 2000 years ago the civilized administration of the fertile fringe kept off mountaineer raiders into the plains, exactly as to this day our own fortified posts design to do. The hills in those days looked as now to supplement the meagre diet of buckwheat and Indian corn, from the well-stored hursts and hamlets of the farmers. The Græco Bactrian Kingdoms of the Punjab, that a couple of centuries later than Alexander extended their sway from Samarkand till they ruled the five rivers, came down the passes with armed caravan and pro-

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tecting picquet, and then set a watch to protect their own fertile conquests from the mountaineers of the regions they had traversed. It is ill taking the breeks off a highlander, and none of the rulers ever set themselves to tame the mountaineers through whose rocks and gorges here and there, some world route made its way. So "*Le Bon roi Dagobert, qui mets ses culottes à l'envers*" continued to rule in the shape of a wild tribal chief, from that day to this, waiting as it were for a Marshall Wade. A Black Watch it often found.

If you read the accounts of the historians who tell of the arrival and progress of Alexander, you will see how his armies and their convoys fought with and bought off—for Danegelt is an old story—the tribesmen of the Khyber. Curiously enough the names of the tribes of those days are the same as to-day. They were the *Pucktidae*, or those who speak Pucktoo, which some call Pushtoo, and the *Aproetae*, which is the Afridi's own pronunciation of his name. Races may come and go, but the pockets in the hills remain. Even in Surrey, where the hills run high and some of the valleys contain no thoroughfare, you will find perhaps a Pictish village of small dark folk, who have never mingled with Saxon and Dane.

Immense waves of immigration have swept into India by certain immutable routes, where the hills in order stand. The Khyber and the Gomal and some of the passes from Kandahar through Zhob and the Baluch hills have had sufficient water and sufficient pass-way to let large bodies through. They have come, Aryan, Mogul, Pathan, Agnicular Rajput and Scythian through the ages, beating or buying, but never subduing, the mountaineers through whose hills they passed. Here and there in the more open valleys that occur from time to time they left guardian tribes. Among them also often stayed pimp and pander and every worthless camp follower to breed such pestilential folk as inhabit the half way oasis of Bannu.

But however it may have come about, the hills themselves have remained independent, sending no doubt horsemen to ride with the conquerors and carve a fortune in Hindustan. Several of the barons and kinglets of India still boast the tribal name of a border tribe. The Begum of Bhopal herself is but an Orakzai acclimatized and civilized for many generations. And the Orakzai fringe the

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Afridi Tirah. For many days till the British brought the Pax Britanica, cousins and landless lads would ride down to uncle and cousin in the plains, who wanted likely lads to help them hold what they had got. Such an old story is this right of the strong man armed!

Now let us turn from all this fascinating welter of a storied past, that would make a thousand sagas, and see the practical problem of to-day, but let us remember that we can no more get away from the past than a man can get away from his shadow. English ways and laws are what Norman and Saxon made them, and they are hard to get away from be they at times never so awkward.

The visions of Napoleon and his some-time friend the Tsar Nicholas, of a joint invasion of India have been alluded to. And they were by no means all visionary. Napoleon himself was in Egypt proclaiming that he was coming to rescue India, and openly sending arms, officers, money, and even rank and file, to his ally whom it then pleased him, for those were Directoire days, to address and refer to as *Citoyen* Tippu. The invasion of India by Afghans was a constant bugbear to Mogul Maratha and their successors the English. The Marathas had been crushed by an Afghan army at Panipat some 60 miles from Delhi, and India laid free to the Douranni for a while. At the end of the eighteenth century Afghans were constantly riding at their will over the northern plains. So late as 1820 an Afghan invader had entered the Punjab. Mooltan, Kashmir and Peshawur up till that period had been Afghan provinces for many generations. It was only the military genius of Runjit Singh, the little Lion of the Punjab, that drove them back into Afghanistan proper. The vision of the conquest of India, and the glory of raids and a harvest of gold and girls was the happy topic of all the border tribes who rode behind the kings.

In the thirties the Indian Foreign Office was very rightly concerned with obtaining stability in Afghanistan and protection against the Russian policy of absorption and slow march on India which Napoleon had urged on them. The lawful Royal Family of Kabul the descendant of Ahmed Shah the Abdalli, the free-lance of the Pearl, had been driven from Kabul by a rival faction. He lived first a refugee with the Sikhs and then a pensioner with the English. Shah Soojah was his name, and with him also his blinded

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elder brother Zeman Shah, also an erstwhile Emperor of Afghanistan, and invader of India, whose name was long used in the Punjab as a nursery bugbear.

The Indian Foreign Office believed that if we restored this lawful (but utterly worthless) dynasty, we should obtain a friendly neighbour, who would stand by us (rather than, as the existing Amir was then doing, intrigue with Russia), and at the same time open up trade via the Indus. It is not necessary to enter into all the controversies of the Burnes mission and our alleged breach of faith with Dost Muhammad the *de facto* ruler. There is no legitimate right of complaint on the part of the Afghans who have never kept faith with anyone and who have always overrun and sacked all they dare. Suffice it to say that rightly or wrongly, wisely or unwisely, it pleased the British and Indian Governments of the day to conclude what was known as the "Tripartite Treaty" in which the Maharajah Runjit Singh of Lahore (the Sikh ruler), Shah Soojah, ex-king of Afghanistan, and Lord Auckland, Governor General of the East Indies, engaged to replace the Shah on the throne of his fathers, in return for certain clauses of friendship and trade. The British Government undertook to enlist and train and officer a special contingent of Indian and Goorkha soldiers, to be paid for from Afghan revenues, or loans based thereon. This was known as the Shah's Contingent, a fashionable and sought after enterprise.

To us in these days the idea of entering Afghanistan when there was not a railway line in the whole of India, and when an independent and by no means consistently friendly Punjab lay between Afghanistan and India, seems madness gone mad. But it must be remembered that we then traversed all India by road and river. That Kabul was far nearer Delhi than Calcutta was, that armies traversed thousands of miles by route march. Mass movements by road had been the thoroughly understood life of India for thousands of years, and the life of the country was organized therefor, that our prestige was high, and that we had often in the past traversed allied states to get at foes beyond. There was no suspicion that we could find in the hills of Afghanistan any more virile or more martial race, than those in any other part of India. It was believed that

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the Indian soldier, principally the Bengal sepoy led by his British officers and backed by British troops would be quite equal to the task.

It is true that originally it was expected that the Shah could be reinstated by his own Indian contingent, but that hope was soon dissipated and Indian troops with little military, though much administrative difficulty actually reached Kabul via Kandahar, and placed the Shah on the uncomfortable throne of his fathers. Further the contempt in which the Afghan sirdar and soldier were held was justified. It was the armed mountaineer, the Afridi, the Baluch and the Ghilzai, alone that seemed difficult foemen to dispose of. It is no part of this story to follow our fortunes and our follies in this episode to their final triumphant end. The triumph was a purely military one, the policy had proved a ghastly failure, largely from feeble execution. It has only been explored here at all to show our first doings with the hill tribes. The Army did not open the Khyber. The longer but much easier route via Sukkhur on the Indus, Quetta and Kandahar was followed. After the occupation of Kabul, the pass was opened by a small force with the nominal assistance of some Sikh troops who feared the Khyber with an enduring fear. Here it was that our troops and our officers first came into touch with the Afridis and such like. Danegelt opened the pass, not quite unreasonably, for it is an old law of the world that those whom fate has located around defiles should live by dues from those who would pass them. The tribes received allowances and the troops had free passage but only to such extent as they kept alert. Any failure, and some unofficial band of clansmen would swoop on the unwary, *more suo*. Our political officers got to have some acquaintance with the chiefs and to some extent formed friendships with them, but it was largely the old story "you're welcome while your money lasts." After the disasters that fell on Elphinstone's force, the troops learnt bitterly the fury of a well armed tribesman against a demoralized force. With the Avenging Army under Pollock (the first gunner to command an army) they also learnt that a tribesman chased is quite a different being from a tribesman chasing.

The Pass Afridis and the British politicals had become "vera weel acquaint," while on the Sind border and in the Baluch hills

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the Baluch and Kakar tribesmen were thoroughly well studied. After the cessation of the Afghan War in 1842, the conquest of Sind (or Scinde as formerly written) in 1843, brought us into permanent relations with the Baluch tribes. It was not however till we became heirs at law to the Sikhs in 1849 that we came to really deal with the frontier as we now know it or to form an acquaintance with the clansmen of Waziristan. John Nicholson and Herbert Edwardes in what is known as "the Durbar Period" from 1846 to 1848 got onto terms with them to a small extent, but their successes dealt more in making the Pathan landowners and their tenants in the Derajat and Bannu keep order and pay revenue, than in taming the actual hill men. Similarly the political officers with the Sikhs in the Peshawur valley got well into touch with the cis-frontier Pathans there, but only had a bowing acquaintance with the Mohmands and Swatis across the actual border.

As soon however as the Punjab was annexed, our civil officers at once had to take over the complete admininstration in a rough and ready form, of all the districts that bordered the tribal hills.

2. The British Period.

It was from this date that the real practical history of the Frontier with a big F begins. Speaking generally Runjit Singh had expelled the Afghans, or conquered those who settled, and held the country trans-Indus up to the foot of the tribal hills. There are a few exceptions, but that is the main line, which remains what is called "The Administrative Frontier" to this day. Within, the people pay revenue and obey the laws and regulations of the Province. Across it the tribes were only in conversational relations, friendly or otherwise with our border officers. They were bound by no laws and held by no treaties, and such formal undertakings as to behaviour that a tribal council might enter into, were perfectly well understood to be binding only so long as the tribe felt inclined to regard them so, or often for so long as the elders could keep the young men from molesting the "gorbellied knaves," chiefly represented by the Hindu traders who conducted the economics of the country side.

A certain number of the young men were found employment in border guards and irregular corps. A Punjab Irregular Force was

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formed of infantry and cavalry from the disbanded Sikh troops both Hindu and Mussalman, and with it very soon after was embodied the Sikh irregular force that had been raised to garrison the Jullundhur Doab, after 1846. These two together formed the Punjab Irregular Force, that afterwards was and is so famous as the Punjab Frontier Force. Incidentally it may be mentioned that it was this amalgamation at an early date of these two irregular forces that accounted for there being two sets of numbers in the infantry of the Frontier Force, till the period of Lord Kitchener's renumbering of the Indian Army. There were it will be remembered the 1st to the 4th Sikh Infantry (so called not for their racial constitution which was mixed, but from their having come from this irregular and special force raised from the old Khalsa army) and the 1st to 6th Punjab Infantry.

The original arrangements for the defence of the Frontier were quite logical. The great main road to Kabul, the road of invasion from Afghanistan, or the road of our possible advance, and there was then no other, was held as it should be by the Line of the regular army. Peshawur from the earliest days, when in 1849 Sir John Gilbert chased the Afghan horse who had come to help the Sikhs expel us back through the Khyber, was held by a large regular force. The rest of the Marches having little main strategic or military aspect, was held by the Irregular Force. This force like many others of its kind in other parts of India, where internal frontiers had a significance, was under the Civil Government. In this case it was the Government of the Punjab, who till quite recent years also administered the Frontier. When any one was tiresome the Frontier Force hit him hard at the behest of the local government and it was a simple matter without the electric telegraph being set vibrating.

3. The Actual Frontier.

It is now time to describe for those who do not know it, the actual geography of the Frontier, and I will venture also to explain to students how to learn and remember this or any other map. I present it to all and sundry who work for examinations. I found it for myself when working for the Staff College as I daresay many another man has. At any rate I give it for what it is worth and

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would presage that it is equally suitable for a plan of Waterloo or a map of Africa. It gives the memory key in each and every case. It is merely a system of equilateral triangles starting from any base. A horizontal or vertical one is the more convenient to remember and start from. You take a pair of compasses and any two places you like as a base. You will then find that equilateral triangles on either side of the base are sure to have some other important or useful place at or near the apex. More triangles described on the sides of the original triangles give you fresh points and so on. Your base may be one or a thousand miles according to the size and scale of the map or plan to be memorized.

For instance in the case of the N.W. Frontier of India, the following approximate measurements illustrate the principle clearly. The two principal crossings of the Indus are at Attock and Sukkhur. Take a horizontal line 500 miles long, and it gives you (approximately) the base Sukkhur—Delhi. An equilateral triangle on this base to the north gives you Attock at the apex. A triangle to the south would give you Baroda near the western coast of India. A triangle described on the Sukkhur—Attock side would give you an apex not far from Herat.[1] And so on without limitations. The whole world could be mapped out on the 500 mile base, and this system worked out by the student for himself gives him the master key of the proportions of the world.

You will notice that the great Indus is the main feature on the frontier, and that the administrative border does not lie far west of it except in the bulges of the Peshawur Valley and of Baluchistan. The Indus emerges from the gorges of the Himalayas just above Attock, and re-enters gorges again at Attock itself, and does not finally leave them till it reaches Kalabagh over a hundred miles down stream. Immediately it leaves the gorges at Kalabagh it enters a wide alluvial delta, and becomes an unbridgable obstacle, with actual banks ten or twelve miles apart, within which it changes its actual course every year, running in several channels in many places. This is known as the *Kachchi*, and is only spanned by temporary bridges of boats before the melting of the snows makes bridges impossible.

[1] Herat will actually be about 100 miles beyond the apex.

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The disputants on Indian Frontier Policy talk of the "Line of the Indus," and "retirement beyond the Indus," and proclaim it as the natural frontier of India, which it is not, except perhaps for defensive strategy. The Indus is only susceptible of a permanent bridge in its gorges, or where it may re-enter any such on its way to the sea At Sukkhur in Sind, it does cut its way through hard substance and narrow banks, as it does again near Hyderabad. There are four permanent railway bridges over the Indus in all its length through India. Beginning at the North, they are the Attock bridge leading up to Peshawur, on the great main road between Kabul and Delhi. 40 miles below this a comparatively recent railway bridge takes the broad gauge line to Kohat. The next one is 450 miles further down stream at Sukkhur, and then 180 miles further down is the Hyderabad bridge.

Now the Attock and the Sukkhur bridges are the two main avenues to the frontier, strategic and commercial. The frontier between them is for modern purposes a curtain, not concerned with the come and go of the outer world. When before and subsequent to the 2nd Afghan War, the occupation of Baluchistan became more and more developed, the Frontier presented a northern and southern main line of ingress and egress, defended and watched by the regular army, with the strategically unimportant curtain of the Afridi Waziri and Baluch Hills in between, of which the greater portion consists of the Suleiman mountains lapped by the shores of the Indus.

Because the cultivating and more or less amenable tribes of and peoples of Northern India had crossed the Indus into the narrow cultivatable flats and valleys bordering on the Indus, so did the Sikh Government have to occupy, administer and protect these trans Indus areas, and so did we as their successors. The natural fitness of things that placed the Sikh border at the foot of the hills, that is to say at the point where the more or less civilized peoples of India met the wild highlanders of the Suleimans and adjacent tracts, still asserts its fitness in the fact that some seventy-five years of direct British rule has not altered the principle.

From all time the more amenable peoples with all the power that organized government brings had ruled in the valleys. Far up into the Kurram to this day, and in the plains and fertile valleys

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of Kabul are remains of a high order of Buddhist rule and civilization by Aryan races. It is also probable that the tribes that we know as Afridis, Bunerwals, Waziris, and the like are of the same race as the Rajput Aryan races of India generally, and the foothills of the Himalaya. Never brought to rule since the days when they halted in the hills on the road to India, they accepted Islam long before actual conquest converted the Rajput tribes in the plains of the Punjab. In fact it is probable that many of the Pathan tribes are but first cousin to the Dogra, that Hindu Rajput race that occupy the lower hills that fringe the Punjab on the Himalayan side. Not all the Pathan tribes are of Aryan origin for sandwiched among them are those of Semitic origin akin to the Douranni race that form the true Afghan. But the fictions of genealogy that emanate from the Pucktanwali, an attempt to prove that all speakers of Pushtoo or Pucktoo are of one race, have entirely obscured the subject. The Afghan proper claims descent from one Kish or Kais, a descendant of Saul of Israel, and their name for themselves is the *Ben-i-Israel,* the children of Israel. This is a descent that may be possible enough, but is outside the scope of this article. Suffice it to say that all Pathans, viz., those who speak Pucktoo, are not Afghans, however much they may now claim to the contrary.

Now the trouble of this frontier tract has been that for all time there has been no defined boundary between the authority of any Indian Government in the last 3000 years, and any Kabul Government over the same period. Or when the Empire was one, as in the Mogul or Turkish rule at Delhi, or in the earlier days of the Douranni Empire of Kabul, between the governors of the Kabul and the Punjab provinces. Between the plains of the Indus and the open uplands of Kandahar, Kabul and the plains of the Oxus has run this tangled mass of mountains that has never owned rule at all. From the Kabul or Kandahar side as well as from the Indus side rulers and governors have pushed their authority as far as they dare. That far depended on the guts of themselves and their soldiery. Sometimes it went farther than others, but it never went very far and it never was complete. Therefore those who think will realize what a very tiresome Alsatia the British found themselves next to in the Year of Our Lord 1849.

In the early days of our responsibility we were able to come

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to some working rule of behaviour, and some code of reprisals. An eye for an eye and a tooth for a tooth at first was the only possible rule. No real policy was evolved. The local officers and the local irregulars did the best they could. But it was obvious that some time or other both the Kabul ruler and ourselves who each had something of the same problem would want some defined area of responsibility fixed between us. It was the object of the Indian Foreign Office during the last quarter of the last century to get this settled.

But whatever way you looked at the problem there was this fringe of very inaccessible mountains between two more or less settled governments which had never in the history of the world been subject to anyone, and who had always lived by the good old rule.

Let us now clear our minds again by looking at the map. Taking the northerly corner where the Indus first emerges from the hills, it will be seen that what is called the tribal area actually here crosses the Indus so that we have the tribal trouble even Cis-Indus. In the past the Pathan tribes have crossed and settled in a corner of the hills, in what has been so familiar in the past at the Black Mountain. The tribes in this part belong to the great confederacy, a very loose one, of the Euzafzai (the sons of Joseph). In the past they have been at loggerheads with the Sikhs and the Kashmir government as well as with ourselves and could always rely on support from the Euzafzai tribes trans-Indus. Our last serious trouble with them was in 1892, the Isazai Expedition. There are several clasps on the old medal for Expeditions into Hazara, viz., the tribal portions of the Black Mountain at the head of our own district of Hazara. Abbottabad is the military centre from which the protection of settled Hazara has been run, since Captain Abbott first took over from the Sikhs the administration of the district. The Black Mountain always responds to the roll of the Islamic drum, but has much quieted down, and under present conditions may be left outside the main frontier problem.

The frontier proper now begins at the foot hills which cut the Indus above Attock, and the sweep round the sides of the long basin known as the Peshawur Valley. Within this basin lie all the tracts known as Buner, Swat, the Mohmand Country, the Pass

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Afridi and the Jowaki Afridi. Down the Khyber along the Kabul river which runs through the Peshawur Valley, to the gate of India at Attock, runs the road from Kabul to Calcutta, or vice versa the road from India to Kabul, nay the very "road to Sămărkănd." Here I put quantity marks since the ear is jarred to hear Sam and Kand pronounced as jam and kandy, in the beautiful play of Hassan.

As the great trunk road from India and the broad gauge line runs into Peshawur and beyond, this is no matter of a curtain, but is the great military concentration area. If there must be war, war is easy.

From Peshawur you now cross that curious peninsula of tribal territory known as the Jowaki hills held by the Jowaki Afridis and you come to the Kohat valley, and the road and valley that leads past Hangu and below the Samana range to Miranzai and Thall and the Kurram. It is this route that gives an alternative way to Kabul, by which Lord Roberts made his dramatic advance after the massacre of Sir Louis Cavagnari the British Envoy at Kabul in 1879. The Paiwar Kotal and the Shukargardan (the camel's neck) are the passes to be crossed and are often snow bound so that the route is not in itself a very favourable one.

From Kohat, a Sikh outpost that blocked the Afghan road from the Paiwar to the Punjab, and a flourishing cantonment since the earliest British days, the old frontier cart road works round to Edwardesabad, that men prefer to call by its old name of Bannu. Thence it winds its way via the Pezu Pass right down to Dera Ismael Khan the capital town of the Derajat on the shores of the Indus. The making and metalling of this road in its time was one of the leading features in the prosperity and pacification of Bannu and the Derajat. From it also runs between the Indus and the Suleiman mountains the lower frontier road which has never been metalled, and which has lost its importance since our advance into Baluchistan completed the pacification of the hill Baluchis.

Between the Kohat-Kurram road and the Khyber Pass as all the world should know live the Afridis and the Orakzais, two cognate confederacies of tribes. And it was into the Orakzai and Afridi Tirah that the great expeditions of 1897 made their way under circumstances to be explained later. Between the Kohat-

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Kurram road and the Gomal river that runs from the Ghuzni Plateau to the Derajat, is a mass of tumbled hills that trend near the Durand Line to cedar clad plateaus. In them, speaking generally, dwell the various Waziri tribes, of which the Darwesh Khel Wazirs and the Mahsud Waziris are the most important, though a vicious little group known as the Kabul Khel Wazirs, inhabiting the hills between Bannu and Thall, are also worthy of evil report.

South of the Gomal we are getting to the end of the Pathan and coming close to the Baluch. The Bhitannis are a smallish tribe between our administrative border and the Mahsud country just north of the Gomal, not numerous enough to stand on their own basis, and rather between the devil and the deep sea, and known as the Mahsud's jackals.

South of the Gomal a small Pathan tribe of especially lawless ways are the Sherannis who inhabit the valleys round the giant Takht-i-Suleiman, and one or two other small tribes such as the Ushteranas who claim Pathan descent. Then come the various Tumans or clans of the hill Baluch, who have long ceased to give much trouble, but who live an independent and respected highland life of their own, owning to some extent lands in the lower Derajat as well as in the hills.

Through their hills come the great southern passes of entry known as the Vihoa and the Harrand whereby invaders and convoys came and went from the direction of Kandahar or Herat towards Mooltan. They are now closed at the other end by Quetta. The Sikhs had several powerful forts blocking the outlets of these passes, which for many years were also held by detachments of the Irregular Force, but are now relegated to the border police. It was on the line from Tank southwards, in the early days of our occupation that the raid and counter-raid took place that made the early fame of the Irregular or Frontier Force, rather than on the more fashionable border by Peshawur. The great horseshoe area of the upper Derajat should be noticed, with the Administrative Border following the rule and keeping at the foot of the Suleimans, in this case far removed from the Indus. This horseshoe holds some famous wheat country, watered by Gomal floods and irrigation cuts. The Marwat Plain between the Pezu Pass and Bannu is another fertile wheat plain. The Baluch hills curl round by the next great

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horseshoe of Kach Gandava, across which the railway runs to Quetta and slowly climbs to the 5000 feet of that upland area. The Baluch tribes at length give way about the level of Quetta to a Douranni, i.e., true Afghan clan, the Khakurs, and to a curious people of similar appearance but distinct ethnology, the Brahuis.

4. The tribal policy question.

The foregoing has given the reader a gallop through the ages and an actual canter round the border which the sketch maps accompanying this paper will help to make clearer, and we are now better equipped to understand the next question of how best to treat the tribes. This will bring us to the effect of the war, and I shall endeavour to show how this spectacle of the civilized world tearing itself to pieces and casting its wealth into the sea has not unnaturally spoilt the whole ethics of frontier behaviour and torn up the work of years.

It has been explained how the curtain of our frontier has no modern thoroughfares except via Quetta and the Vihoa, or via the Khyber and the Paiwar Kotal. Between these great gangways there is no need for an elaborate military defence against invasion. It is true that the Gomal in the centre is an ancient route via Ghuzni, but it does not bring the invader to any advantageous area in India. That being so, there was no advantage to be gained in times at any rate of financial strain, as after the annexation of the Punjab, by having more dealings than necessary with tribes and peoples who had been outside the Sikh jurisdiction also and who would certainly not repay the cost of control. It was sufficient to prevent serious raid and to encourage peaceful trade, and come and go. Further we had so recently burnt our fingers badly in our attempt to go beyond the Sikh borders to Afghanistan, that there was little to be gained by adventures across the border on the Peshawur portion of the frontier. It has always been the case that the less the transfrontier tribes saw of us at any rate across the borderline, the more they liked us, and very friendly relations grew up between headmen and our frontier officers. Our policy of non-molestation of families engendered similar behaviour on theirs so that English ladies and children were immune in the most exposed

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stations, although their husbands were never safe from the knife or pistol of the fanatical assassin.

Whenever the tribes misbehaved either *en bloc* or through individuals, it was marked down against them. If they had allowances from the British Government for services performed, such as the protection of trade routes and the like, a portion of such allowances would be withheld. The system of tribal allowances in the past have excited derision. But they were granted for two main reasons, first for definite services to be performed in connection with the protection of trade routes and secondly for creating a credit against which fines could operate. Not altogether a foolish principle when studied, but often laughed at as Danegelt. When the tally of offences or of unpaid fines mounted up, a punitive expedition would take place, with destruction of villages and cattle. But it was recognized that punitive expeditions were but poor in their results and that burnt villages made bad neighbours. Sometimes a blockade would be tried, which meant that no one of the blockaded tribe would be allowed access to markets in British territory, and that no salt export would be permitted. A bărămptă was another means of reprisal, which meant that all men of an offending tribe in British territory would be seized and held till reparation had been made. And it may be said that such offences were usually raids into British territory and the carrying off of flocks, Hindu traders or girls.

Perhaps the most effective reprisal of all was the short sharp counter-raid, made by a well-equipped party of the Frontier Force, such as we have seen in more modern times in "Tonnachy's raid to Makin."

Now this method of dealing with turbulent neighbours had little in theory to commend it. The problem of civilization was in no way advanced. Our reputation as civilizers and the solvers of racial problems was at stake. "True," said the wise heads of the day, "but in taking over the Punjab and running 300 million folk in India with ten men and a boy we are doing no small thing. Nor have we money to spare, especially as it is paid by the Indian tax-payer. No ! no ! let well alone at any rate for a while, and for ever if you are wise." And let alone it was to the great satisfaction of the tribes themselves. It will be remembered how in '57 our strong

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hand at Peshawur and the general content with our ways, brought the trans-border lads gladly to our hand, to ride in our wake to Delhi, as they had ridden with Nadir Shah, and the Abdalli, and anyone else who offered leadership and reasonable guerdon.

The immediate post-Mutiny period was not a difficult one. The wise policy of Lord Lawrence, initiated and driven through by Herbert Edwards, of making friends with the Amir and inviting him to Peshawur a year or so before had had immense results. Dost Mohammad, the Amir we had driven out in favour of Shah Soojah and finally restored, stuck to his friendly agreements. His refusal to countenance any proposals to turn on us, or recover the lost Afghan province of Peshawur, kept the tribes from troubling. In fact most of those who would have given trouble had gone to Delhi and Lucknow and come back well content. Except the hardy annuals the Mahsud Waziris, there was no serious bill of damages piling up against any section. Even the Afghan War of 1878-81 produced nothing very serious, and up till its conclusion the old close border policy of let-well-alone answered well enough. But such a state of affairs was contrary to the spirit of the world. Change and progress good or bad there must ever be.

Before the Afghan War, trouble from the old source had appeared. Russia was pressing forward to the Afghan border, and absorbing the Central Asian Khanates. In the teeth of the advice of Lord Lawrence and men of his school, an attempt was made to put our strategical position on the Indian frontier into some tangible order. Colonel Colley, the unfortunate Sir George Colley of Majuba, was Military Secretary to the Viceroy, and an able student of war in its wider aspects. His reputation as a thinker and a strategian brought him to a position in the Viceroy's counsels that did not belong to his official position. It was largely through his exertions that the military authorities in India and the Government of India adopted what is known as the "Forward Policy." This included the permanent occupation of Baluchistan, and the commencement of a long continued programme of roads and railways in Northern India. The arrival of Russian agents once again in Kabul, and the necessity of the making an Afghanistan that would assist us to keep Russia at a distance and which we would defend against Russia eventually brought on this second Afghan War.

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That war left us in permanent occupation of the Kurram Valley, it changed the position in the Khyber, while the general move of the times and the need for protecting trade routes brought in its train still further control of the transborder hills.

The gradual acquisition of rifles by the tribes from various sources increased their military power, and also the desire to use their armaments. The power to raid more freely was thus given them. The march of modern thought ultimately brought up the question of whose responsibility were they, and at what point did the Amir's cease and our own commence. It was felt that there could be no finality till this was settled. It was generally admitted at the time that the actual clans on our borders never were part of the Afghan kingdom except so far as they lived in glorious independence in the midst of provinces conquered by Moghul invaders and at last by the Afghans.

This difficult question was at last settled at any rate by treaty and on paper in 1893 by the Durand Boundary Commission and subsequent transactions, so that for many years now there has been a definite frontier between ourselves and Kabul. We were free so far as we thought wise to do what we liked within that line. For some time our policy was put to open up and secure the various trade routes. In the early nineties we had to hold the Samana ridge, to protect the settled tribes along Miranzai and the route to the Kurram from Orakzai and Afridi raiders. In 1894 protection of a boundary commission and the necessity for a better control of the Gomal Pass, brought about the occupation of Wana, and this was succeeded by a similar and all too necesary occupation of the Tochi caravan route to Ghuzni.

Then a fresh activity of Russia had given us very difficult problems in the far North corner. Russian officers and Cossack escorts from the new Russian stations in the vicinity of the Pamirs, had crossed the Hindu Kush and were disturbing the tribes who were part of the Dogra Kingdom of Kashmir. Gomchetski and Yahoff between 1889 and 1892 had come over to the Baroghil and the Dorah passes. In securing this part of the world against such disturbing elements the British and Kashmir Governments carried out the Hunza Campaign, and occupied Chitral which was part of the Kashmir suzereignty, with a view to closing the Dorah pass. The

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subsequent attacks on our garrisons there necessitated the Chitral Relief Expedition, and left us with a permanent garrison far away in Chitral, and also in occupation of the Malakand.

Then a variety of circumstances produced the great frontier conflagration of 1897, when all the border burst into flame. There were many reasons therefor. Dissatisfaction with our forward movements to protect trade routes or secure passes, the Græco-Turkish war and the triumph of Islam, a general stirring of Moslem intelligenzia, no doubt all contributed to the outburst. Very large forces had to be employed to suppress the risings, very great expenditure was incurred, and when it was over, we were naturally left with large forces across the border occupying Miranzai, the Tochi, Wano and the Gomal, up the Khyber, and in the Malakand. Such service was none too popular with the bulk of the Indian Army, its cost was very great, and it was also locking up a large portion of the regular army and some of our best officers, at a time when Russia was talking very openly of her designs on Afghanistan and India, and when Lord Kitchener was about to reorganize the army and all its mobilization arrangements with a view to facing a Russian campaign on the Helmund.

5. Lord Curzon's Policy.

To Lord Curzon the position appeared absurd. Thousands of regular soldiers and their modern equipments locked up in tangled curtains of the frontier which led to nowhere. Was it necessary was it desirable, was there any finality? It was not civilization by means of roads and hospitals and civilizing influences, it was certainly not glorious isolation. It was costly with little to show in return. The business of the army was to defend India, and while it must be located along the tribal curtain if need be, it seemed entirely unnecessary to use it for such a purpose then. Now it is here that we shall find one of the main points at issue when we come to the present situation. In Lord Curzon's time there were no two words about it.

We may here very well refer to the great controversy as to what is known as the "Sandeman policy," which means the methods and principles followed by Sir Robert Sandeman and "the Buster" (the household name for the famous Sir James Browne), in pacifying

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the very wide area of Baluchistan, which certainly for thirty years had been eminently successful. Now the Sandeman policy consisted in making the tribal chiefs absolutely responsible for the behaviour of their tribesmen, of giving them arms, money and status, and putting them in a position to use their authority. They also were paid to maintain tribal levies, to perform semi-police duties in their tribal areas. With this policy went that of roads and ameliorations wherever possible. It was the fashion in Baluchistan to deride the constant turmoil of the Punjab Frontier (the present Frontier Province being long a portion of the Punjab).

The Punjab officers were wont to say and with great truth :—

(a) Your people are really tribal, and have for generations been accustomed to the control of chiefs. You are only improving and developing a time-honoured institution. None of our people are similar. They are republican, democratic, and intensely jealous of any of their big men exercising too much authority. You can only introduce the Sandeman system by so supporting one man that he will openly murder every opponent and try to subdue opposition by fear. We also try and work through chiefs but with poor results for reasons stated.

(b) Baluchistan is a high plateau and very open and accessible. Troops can get about at all seasons, and cavalry can always manœuvre in the parallel valleys between the hills. Your tribesmen have a good deal to fear at Government hands. Our tribes live in the most inacessible valleys approached through a climate that for six months is terrible. Further, while with you the demands of trade and of external strategy induce the Government to open its purse strings to improvements in Baluchistan, there is no such inducement for them to help us.

(c) Thirdly we believe military opinion has long held that the tribes of Baluchistan are not the determined fierce foemen that ours are. .

The above puts before us this very big controversy. No doubt as in all things, there is something to be said for pressing the Sandeman system, and where possible it has been pressed. Mr.

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Bruce, the Chief Commissioner of the Derajat, at one time responsible for the policy with regard to the Mahsud Waziris, who had long served under Sir Robert Sandeman, did his best to introduce that officer's system. For a long time "Mr. Bruce's Maliks" were tried and gradually failed to be more than some of the more prominent men. The confirmed democratical instinct of the race had proved an insurmountable obstacle to the system.

6. The Militia System.

Lord Curzon's policy was based on reason and common sense though not perhaps taking full thought for the perpetual unreason which characterizes to a great extent the tribesmen. Yet knowing that they must have, nay, actually have human instincts he hoped once again to develop them. The Curzon policy was to withdraw all regular troops within the border, to withdraw also as many as possible to cis-Indus stations, and to keep them trans-Indus only on the main Northern and Southern lines, retaining elsewhere only a minimum for the immediate reinforcement of irregulars.

Militia corps were to be raised from the local tribes, who would thus find a subsistence for their young men. The Militias were to keep law and order on the main trade routes, and on the actual frontiers, and generally interpret the accepted wish of the tribes for order on the trade routes, and no interference elsewhere. The tribes were further to have allowances for services rendered. A good deal of road making was to take place, and as far as possible the tribes were to carry out the road work, and thus obtain a further source of livelihood.

The Militia and other semi-police corps consisted of several categories. Militia itself is a misnomer. The first category, the so-called Militia, consisted of permanent corps well equipped and well trained with several British officers. Their training and style approached to that of the Regular Army. They were however entirely at the disposal of the civil authorities, and were not under the command of the adjacent military districts. The Militia proper held the transborder areas, on the main routes or adjacent thereto. Viz., from the north :—

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The Khyber Rifles, keeping open that route.
The Kurram Militia holding the Kurram and the upper route thereto.
The Northern Waziristan Militia, holding the Tochi Valley.
The Southern Waziristan Militia, holding the Gomal and the Wana Plateau.
The Zhob Levy, maintaining order in Zhob.
The Chitral Scouts away in Chitral, outside the main picture but based on similar principles.

The second category were corps of Border Military Police, who held a number of fortified posts along the adminstrative border, and were there to stop petty raiders. They had not the military organization of the Militia, and had only one or two police officers in charge of battalions. They consisted of the Samana rifles, the Bannu Battalion, the Dera Ismael Khan Battalion and the like. They were of far earlier origin than the Militia and were chiefly composed of local men. Their fighting value was not very high, and it was not safe to give them the best rifles, as exposing them to too much attention from tribesmen who might covet the arms!

The third category were the Levies, the Catch-em-alive Oh's or "Catchies" in the border jargon. Their nickname is said to come from the mysteries of their toilet. They were local tribesmen maintained by headmen from the allowances paid to them, to protect certain areas, and they were armed by the headmen and not by Government as a rule.

Now the efficacy of such a system really depended on the general good will of the border people, and the intention of the headmen to abide by their agreements. They could only restrain the wilder and unauthorised elements of mischief, whom more sober opinion discouraged. In fact the existence of a border force drawn from the people to keep them in order depends entirely on the general good will of the locality. Such a force could not last a moment if in the general opinion of friends and relatives they were carrying out an intolerable duty. This is a point which rules the whole story and argument.

Unthinking people got to talk of the Militia as a "first line of defence." Nothing could be further from the truth if a military sense is meant. With the whole tribes against us the Militia and

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Border Police if transborder men, must go. Their families are with their clansmen. If Afghanistan is to attack us, unless the tribes are with us and against the Afghans, the Militia must go too. The policy was a device to make the people keep order themselves at our expense to the mutual advantage of all concerned.

Now the Militia system on the lines indicated went on well enough for about 15 years. The militia officers and the political officers acquired a good deal of influence, and there was a reasonable amount of good will. Chiefs were sending their sons to Peshawur and other schools for education. Civilization was penetrated a little, slowly but tangibly, while a very considerable number of young men enlisted in the Indian regiments. But the system failed to some extent in Waziristan, especially in the Southern Waziristan country. The entirely unreliable Mahsud failed at the test. Arrogant, pigheaded, faithless, three-cornered, attractive, jaunty, soldierly, he murdered his officers time and again and could not fill the bill. A little further away from his own dunghill, in the Northern Waziristan Militia, he was somewhat better. But speaking generally his place had to be taken by transborder men from other portions of the border, or frontier tribesmen within our own border such as Khattaks. In this case it was a negation of the system, that of finding employment by the people policing themselves. Still this failure did not vitiate the whole system, which was to keep the army away from the come and go of police work.

Behind the levies at Kohat, Bannu and Dera Ismael Khan were mixed military forces of all arms ready to move at short notice. In Quetta and the Peshawur Valley were of course much larger forces. The difficulty was that the crossings of the Indus along the curtain for six months of the year were so poor, that reinforcements could only arrive on the Waziristan Border slowly and with danger and inconvenience to the troops in the hottest area in the world. A crossing at Kalabagh for the broad gauge railway was what was needed.

7. The Great War.

The system described above had given reasonable peace and security for some time, but no finality, for it had been necessary to

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blockade the Mahsuds and to have operations against them, but it was producing more or less the intentions of Lord Curzon and the Government of India. It contributed little however to the human problem of how to improve and pacify this people, assuming that we had a moral responsibility therefor.

The disturbance of a world war, and moreover one in which the head of the Orthodox Moslem faith was against us, and proclaiming a Holy War against us and our Allies, must repercuss in Afghanistan and on the tribal border as it did in India itself. The Amir of Kabul was true, or as true as he dare be to that bond of brotherhood that Lord Kitchener and Sir Henry MacMahon wot of. To calls from the Kaliph he but said, "I am ready. When the Turkish armies arrive at my border, I shall be there with supplies and assistance."

The excitement of the war, the strange rumours, the advance on Turkey, the occupation of Mesopotamia, all gave occasion for wandering and irresponsible Mullahs to preach hatred and attack on the British. But the frontier behaved reasonably well. There was a sharp inroad or two in the Peshawur valley, promptly tackled. There was trouble in the Tochi, also promptly put down, and though as was to be expected the Mahsuds eventually gave trouble, and with the young troops only available were not easily suppressed. But still the Government of India were able to prevent anything really serious from what might be called a military aspect.

On the other hand law and order along the border was deteriorating, to the great disadvantage of the peaceful inhabitants within the border. As the war rolled on, arms were becoming very plentiful. The Mahsuds had armed themselves at the expense of young troops, but throughout the whole of Asia arms were becoming a drug on the market. No doubt the rifles of the Kut Garrison largely found their way into the hands of the Asian traders. Immense quantities of arms and ammunition left by the Turks after their defeats on the Tigris were secured by Arabs before the British could get possession of the battlefields. The break up of the Russian armies in the Caucasus and in Asia threw hundreds of thousands of rifles on the hands of thieves and traders. Ammunition lay about like the sand of the shore. Therefore a people who at one time

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obtained modern arms with difficulty became fully equipped at a low price.

The whole of the tribes therefore on the North-West Frontier of India were and are saturated with modern arms and ammunition. And arms are their great hobby and the care of such is their natural vocation.

With the lawlessness bred of war and rumours of war, raiding parties into India became larger and their operations more frequent.

Life for inhabitants within the border became unendurable. No one was safe. Traders, women, cattle, were constantly carried off and held to ransom, men were frequently murdered, and anyone who resisted got short shrift. The protection required grew beyond the power of the armed police. The Militias were not on the spot. The tribesmen in fact had ceased to raid, they invaded, and large well-armed parties would leave piquets to secure the defiles and difficult places through which they must return. Intercepting parties trying to secure a defile when raiders were out to intercept them, would find well-armed parties defending these very defiles.

Then came the great aftermath of the War. Habib Ullah the Amir was dead, killed it is said by his son, the present Amir Aman Ullah who immediately after the trouble in the Punjab threw himself on India, formally declaring war and advancing on the Punjab. The appeal to Islam, the wild rumours afloat, and the grand opportunity for all brought the tribes in on his side. And the Government of India had to face not only the whole border in an uproar, but the Afghan Army pressing in the Khyber, in the Kurram and in Baluchistan. It was a crisis that had never occurred before, and had never been contemplated, and it occurred when the army was in the act of demobilizing after the Great War.

All the work of years went by the board. The Militias and levies faithful only so long as the people who found them approved their service, speaking generally went, or were likely to be so unreliable that it was better to release them. Under circumstances which need not be discussed here it was thought desirable to withdraw officers and men of other tribes from the advanced posts the Militia held, before they were overwhelmed. The Militia therefore disappeared, with of course certain notable exceptions on the part

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of special portions and certain clans. The Border Military Police also largely disappeared. The strain was too much for them. Thus it was that the change of circumstance, and the march of events that could not fairly have been looked for, so changed the whole state of affairs on the frontier as to make Lord Curzon's system at any rate for a considerable time unworkable, especially on the Bannu—Dera Ismael Khan part of the border, that is to say, the Waziristan portion.

The tribesmen looked to Afghanistan after the defeat of the invasion, to relieve them of the penalty of their misdeeds. The Amir anxious to pose as the protector of Islam and the real overlord of the tribes, argued their freedom from punishment backwards and forwards in the discussions as to a peace treaty. He had no shadow of right on his side, and any yielding on our part was only due to expediency. We have refused to admit any authority on his part over the tribes.

Unfortunately the fact remains that the Amir as an Islamic ruler as well as somewhat of the same race, does cut a good deal of ice with them, especially when they happen to have no grievance against him. To a great extent the tribes will dance to his tune as regards hostility to India. He can always disturb them if at any time he wishes to annoy or influence the Indian Government.

8. THE PRESENT SITUATION.

Now when the Afghan War was over, the resettlement of the frontier had to be taken seriously in hand. Waziristan, especially the Mahsud portion of it remained at open war with us. Very difficult operations against very well armed and trained tribesmen (our own soldiers and militiamen for the great part) tried a very young army greatly during 1919, 1920 and 1921. Eventually when a sufficient *modicum* of success had been achieved the time for a settlement had arrived. And here we come to the modern controversy.

The General Staff put forward their view to the Commander-in-Chief and the Government of India, that however undesirable it might be to lock up the army on a frontier that was off the main line of advance in or out of India they saw no other alternative. After all an army existed to protect India from foes whatever their type. They showed how for nearly seventy years this portion of the

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frontier had called for military operations at vast expense every few years, without the least permanent betterment. That however much the Curzon policy had done well, it had been torn in pieces by the Great War and the conditions were not favourable to rebuild it. In any case none of the operations and policies of the last seventy years had produced any civilizing results. They definitely recommended the making of a motor road right through the inaccessible highlands and the stationing of troops on one of the healthy plateaus dominating the country of the most unyielding tribes. Hitherto the troops supporting the militia and police had lived in the most terrible heat for the best part of the year and were never fit in the summer. Let, they said, the troops live in the same healthy highlands as the tribes. Let us emulate Marshall Wade.

The "Political" opinion, that is to say the opinion of the civil officers (some of them soldiers) who had been administering the frontier, differed. Some saw only salvation in the advice of the General Staff, others thought that the old position and *status quo* could be easily restored and made to work as well (or as some would say as badly) as ever. They said "the tribesmen are bewildered, they don't know what Government demands of them. The fact that the Great War has disturbed them is not to be wondered at. Let us get back to the old border, and get back the old semi-kindly relations. Let them have continuity of policy and continuity of frontier officers."

The Government of India have accepted generally after no doubt mature consideration the military advice, which the Commander-in-Chief backed. The demand for economy has ruled out some of the recommendations, but the two main facts remain.

(a) A great circular graded lorry road has been made right through the heart of the Waziristan and especially the Mahsud country, from the Tochi road right down past Jandola to Tank in the Derajat plain.

(b) A strong force with civil headquarters also have been located at Razmak on this road, a small upland valley 6500 feet above the sea, within Howitzer range of Makin and Kaniguram the seat for many years of all the trouble. The cantonment of Razmak actually overlooks them.

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(c) The Militia has been partially reformed, as the Catchies, reformed as "Khassadars," but with a military force at hand to support them, instead of far away.

Eventually it will probably be possible to reduce the other supporting garrisons. Certainly the remaining roads both within and across the administrative borders will gradually be improved to take armoured cars and police patrols. Possibly, gradually some love of ease and civilization may be induced. At any rate the new policy will certainly make some faint start in that direction. On the other hand it is a wise man who will prophesy. And it should be realized that the tribesman has the wildest ideas of what is happening in India, and many there be who think that the strong hand is being withdrawn, and that Lahore and Delhi will once again lie bare to the *Schwartz-ritter* from the North.

One point we may take for certain. The policy is a definite one, even if as some say not the wisest. A definite policy logically carried out will always bring a good measure of success in cases of this sort.

9. The main Frontier.

A word of the main Frontier, the Frontier, that is to say, of India against attack and invasion from the North West. It has three aspects, Baluchistan, the Khyber and the cognate Khyber question of the Kurram.

The last Afghan War entirely changed our views. For many years we have been the contemplated ally of Afghanistan and protector of her independence against Russia. All the organization in Lord Kitchener's time was based on this aspect. But we have now seen a hostile and offensive Afghanistan attacking India in times of internal trouble in our day. Such had never happened within our experience, not even in the troublous times of '57.

That being so it was essential to prepare against a repetition. During the Afghan War great improvements were made in increasing sidings between Lahore and Peshawur, and also between Sibi and Pishin. Since the war the broad gauge line has been driven through the Khyber and will shortly open to Landikotal. It is hoped before long to convert the little 2′ 6″ line from Kohat to Thall, to a broad gauge after the experience of the Afghan advance

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by that route. It is worth remembering and it is very often forgotten, that both the lines from Lahore to Peshawur and still more that from Sibi to Pishin, are mountain lines. They look fine and broad and simple on the map, but in reality their gradients are very steep. On both lines but far more so on the Quetta line, the number of full trains a day that can be brought up is very very small. Trains can pour into Lahore but after that it is a very different story on the Northern line. Trains can rush to Sibi, but thenceforward they must be divided into three and crawl with two powerful engines. The map does not tell you this.

But on both lines great improvements have been made since the Afghan War. Unfortunately the requirements of modern war have so increased in the last few years, that any improvement in railway capacity is swallowed up, as regards actual gain on the older situation.

One more word as regards railways. The rapid reinforcement of the Waziristan frontier has always been the crux, especially in the summer when the bridges of boats between the literal Sind Nagar line and the other bank of the Indus is stopped by floods. It is hoped that before long a bridge near Kalabagh that will eventually carry the broad gauge into Bannu will be undertaken. That done, the smashing of a large scale tribal rising will assume an easier and a much cheaper aspect. It is perhaps a special difficulty that India should be called on to face these troubles on the top of the financial aftermath of the Great War.

A word also to those who may be sent to the Frontier. I have known it in all its aspects for many years from one end to the other, and I say that all the old romance of serving there is still there. The raw red hills, that are wildness personified, the bitter cold and snow of winter, the caravans of hairy tribesmen, the great Central Asian camels, the grey mud frontier forts, the *chikor* and the *sisi* to shoot, the highly trained mountaineer troops, the mule batteries, the "flying bullet down the pass, that whistles shrill all flesh is grass," still there, still there, and perhaps the most haunting of all, the smell of the camps, the camel, the asafœtida and the wood smoke.

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SNOW CAMPAIGNS.

By Major-General Sir W. E. Ironside, K.C.B., C.M.G., D.S.O.

SINCE the Armistice in 1918, the British Army has been called upon to carry out two campaigns under severe conditions of frost and snow—in North Russia in 1918-19 and in North Persia in 1920-21. Small wars are notoriously struggles against physical difficulties rather than against the efforts of an enemy and these two campaigns were no exception to the rule. In both theatres the climate presented violent changes from heat to cold, necessitating ample and complete previous preparations for the supply of transport. In North Russia no previous preparations had been made for the employment of mechanical transport on a large scale, whereas in North Persia it had been the intention to rely completely upon motor transport. In these days of mechanicalization it is well to remember that there are still conditions under which recourse will have to be had to the older and slower means of transportation in order to secure mobility in a small war. In the past, our officers have been experts in the management of every known means of transport from camels and elephants to pack-porters. These two campaigns were full of varied experience and it is important that the adaptability of the British officer should not be allowed to decay and be lost for ever. These few notes may therefore be of interest to future campaigners in similar conditions.

North Russia.

The Allied Forces entered Archangel in August 1918—late summer in North Russia. Campaigning conditions at this period were almost ideal. River transport took the troops everywhere and there were sufficient flat-bottomed boats available to move troops and stores to any desire point on the network of waterways. Roads were dry, though rough and unmade, and there were plenty of country carts and sturdy ponies for movement away from the waterways. Aeroplanes could land on and take off from the cleared meadows round the villages, whilst seaplanes had countless lakes and rivers for their operations. The temperature was that of a warm English summer and the troops could wear the lightest of kits,

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General Ironside in Travelling Kit.

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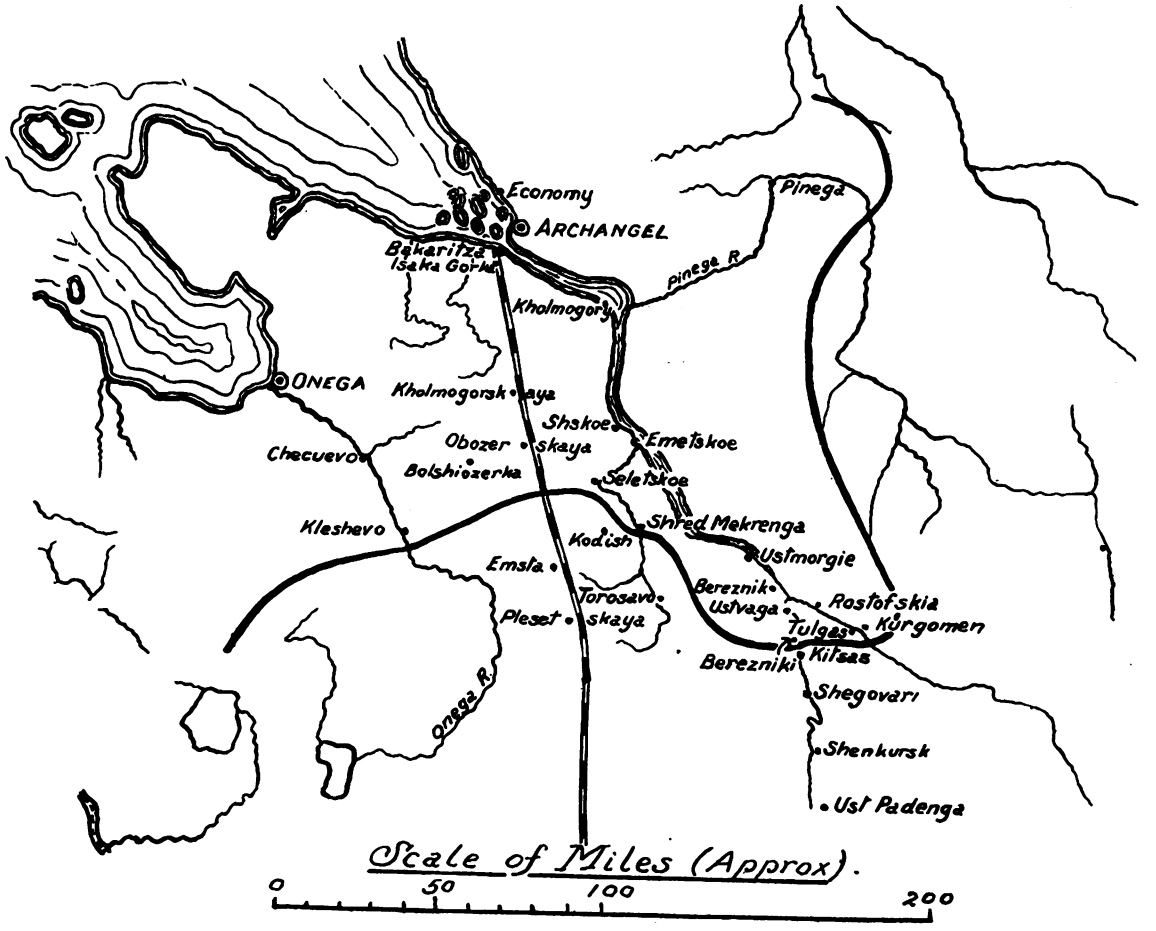
AREA OF ARCHANGEL OPERATIONS.



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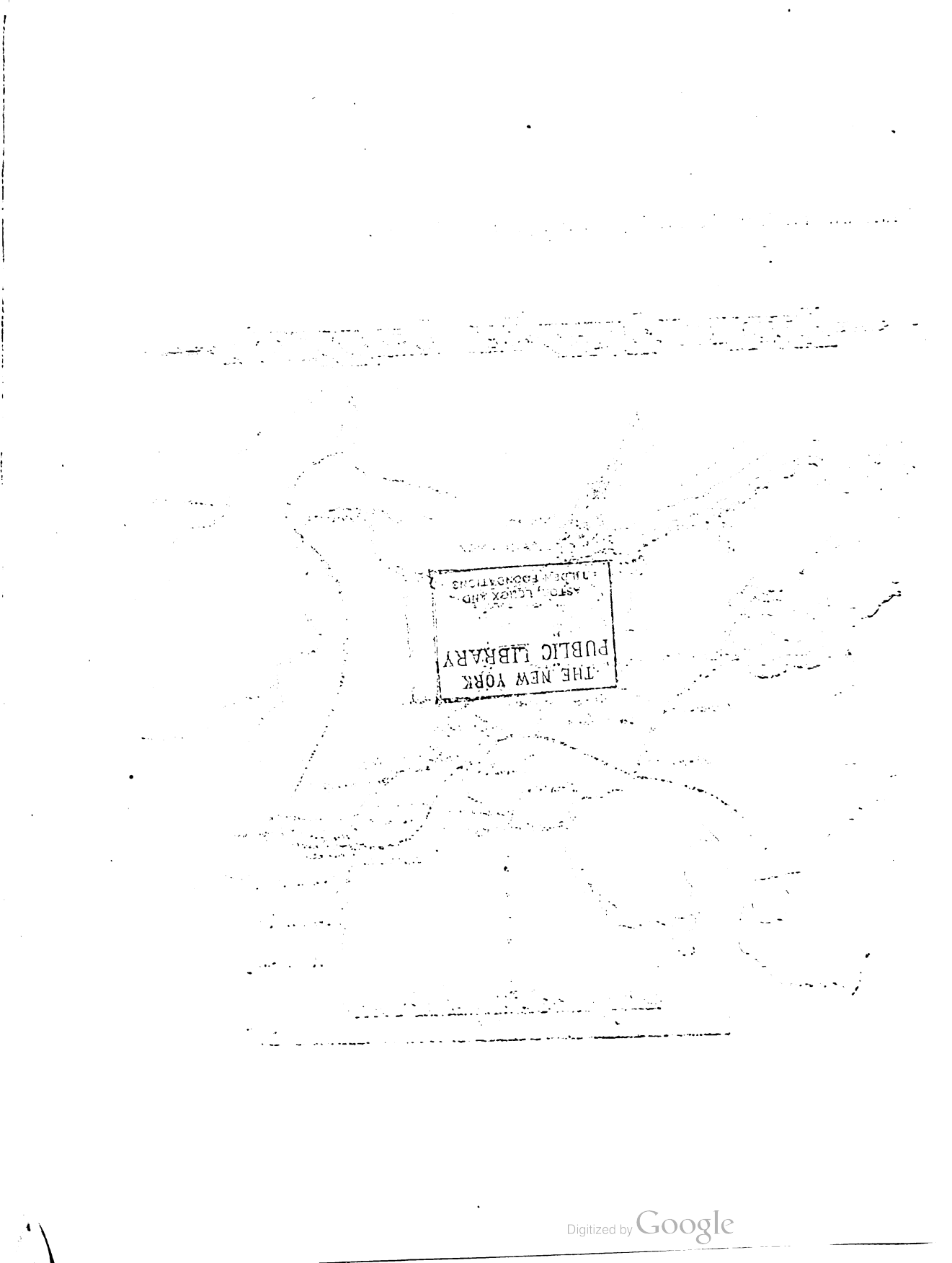
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sleeping out of doors at night without fear of ill. A bathe could always be obtained at the end of the day's work. Everything favoured the assailant, for there was no long night, only an hour or two's twilight, whilst the forest effectively hid all movement. July, August and September were free from the mosquitoes and other winged pests which arrive after the frost has disappeared, and which make life a burden during the latter half of May and the whole of June. During this favourable period the Allies pushed forward inland along the Archangel—Vologda Railway and up the Rivers Dwina, Emtsa, Pinega and Vaga, encountering little opposition and occupying the positions which had been considered necessary for the guarding of the port against any advance on the part of the Germans, should they show any intention of pushing on via Petrograd to establish submarine bases in North Russia.

By the end of September conditions began to change. Heavy tropical rains set in, rendering the roads impossible for transport and the meadows impracticable for aeroplanes. Water transport still worked well, as did the seaplanes, but operations upon any scale away from the waterways became impossible. For the soldier the good times had gone, but for the artist perhaps, October is the most beautiful month in North Russia, the "tundra" offering a wondrous sight. Overhead, the autumn tints of brown and red are mixed with the light and dark greens of the firs, whilst every now and then the stem of a giant silver birch shows up in the sunlight. Underfoot, there is literally a carpet of cranberries and blayberries, splashing one's feet as one wades along through the morass. Impossible to dig trenches, for the ground deep down is never unfrozen and the water cannot drain away. A wooden platform behind a log breastwork takes the place of a trench. The whole force required an issue of those long rubber boots so well known in Flanders, and in these they lived from the commencement of the rains until the arrival of the frost. This temporary lull in the operations was a respite for the administrative services, for an order had come out to prepare for a winter campaign in North Russia. Supplies and reserves of every kind, including a complete change in much of the clothing of the troops, had to be rushed up to the various columns before the freezing of the waterways, and the final positions of the fighting troops had to be settled with a view to

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their communications in winter being maintained by sleigh-transport. The registration of this transport, the mapping out of the sleigh routes, and the actual collection of convoys at starting points, required many officers and much exhortation of the Russian peasants, who are always disinclined to begin work after the celebrations which follow the gathering in of the harvests. None of the Staffs of the Allied Forces had much weather-knowledge of Northern Russia and there was at first much anxiety as to whether the columns would not be isolated without means of transport and at the mercy of a more mobile enemy.

The composite nature of the Force complicated matters in everything. For the good of the troops it would have been preferable to have kept the various columns homogeneous, consisting of one or perhaps two nationalities at the most. Thus, matters administrative and linguistic would have been simplified. But, the small jealousies which occur under such conditions seem to be inevitable. Each column and each nationality conceived the idea that they alone were bearing all the burden of the day and that the others were either in a more comfortable area or were lounging at ease in Archangel. Thus, the better system had to be abandoned in favour of composite columns where all the nationalities were represented and as much in contact with one another as possible. As regards the armament, it was lucky that it had been decided to arm all the contingents with the Russian regulation rifle, large quantities of which had been discovered at Archangel. We were thus mercifully spared many different kinds of small-arm ammunition. Uniformity was, however, impossible as far as artillery was concerned and the armament varied from 75's and 18 pdrs. to field guns of Russian, Japanese and German make. Rations had been calculated upon a generous scale in order to supply the body-heat required in such a climate, but this did not suit the idiosyncrasies of the various contingents. The French required their "pinard" or red wine, while the British demanded their rum. The Americans were dry but demanded both "pinard" and rum. They would also only drink coffee instead of tea. The Russians required twice the amount of bread that the others did and a smaller ration of meat. It soon became apparent that each nationality was quick to demand the extras to which they were entitled according to their own ration

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scale, but were loth to give up any of the extras which were contained in the excellent British ration and to which they were not entitled. When it is considered that the Force was composed of British, French, American Polish Russian, Italian, Czech and Chinese contingents the difficulties of the administration will be realised.

When winter came, it burst upon us with dramatic suddenness. On October 24th, a little snow was mingled with the rain, and by October 30th everything was frozen up and deep in snow. Everybody was going about in furs turned up to the eyes. Wheels and water-transport had been replaced by sleighs. The seaplanes disappeared and the aeroplanes took to skis instead of wheels for starting and landing. Aerodromes on the meadows became workable again and remained so except where the wind raised great drifts. Clearing these drifts by shovelling proved too great a task and the levelling was best effected by the marching up and down of battalions of infantry, the Russians in their long felt boots being the most efficient levellers.

The winter clothing for the Force had been sent out in good time and proved efficient except as regards some details. It had been designed by the late Sir Ernest Shackleton. Underclothing, coats and trousers remained the same. The hat was of thick cloth, fitting close down over the forehead with fur flaps ready to pull down over the ears and the back of the neck. The coat was of lorry-driver pattern lined with sheepskin. The collar of the coat, though broad, had no fur and the arms were not lined. Both these faults had to be remedied locally. The boots were made of white canvas, without nails in the sole and folding over the instep with tapes. They were made with the primary idea of using them with skis, and the smooth and slippery sole had to be barred with football bars before they were fit to use as a general service boot. It would have been preferable to issue the "Vallenki" or long Russian felt boots, but these could not be made outside Russia, although patterns were sent to England. The long felt boot would have obviated the use of putties which were objectionable in that they stopped free circulation. It was found very important that nothing, not even excepting the underclothes, should fit tightly to the body, in order to ensure good circulation. In consequence, the men looked very clumsy and were in fact far from as active as they should have been. For special mobile work, suits of gabardine were supplied. These

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were wind-proof, but were of little use for keeping off the cold when at rest. Gloves were of ordinary wool, with the trigger-finger separated from the others. Round the neck, suspended by a tape, hung gabardine mittens, lined with flannel, into which the hands could be put when too cold to continue working.

The severity of the winter may be gauged from the lowest temperatures recorded during the campaign :—

November	- 10°
December	- 5°
January	- 40°
February	- 53°

During the long winter, the Allied Forces found themselves compelled to act on the defensive against an enemy of inferior fighting value but superior in numbers, perhaps the worst predicament in which a force of Regular Troops can find itself. There were also several other factors which increased the difficulties of the situation. The Armistice was known to have been signed and yet hostilities in North Russia were still continuing. Large numbers of men had already been released from service from other theatres of war, and yet the men in Archangel knew that there was no escape from their theatre until the following summer. There was a coplete absence of all letters and papers with the little items of news which bind the men to their own country. A general state of anxiety prevailed amongst all ranks as to the exact objective of the Force. The perpetual darkness and the cold had a depressing effect upon all ranks, inducing a feeling of carelessness as to what happened and a strong desire to hibernate indoors. The system of physical training and active games which is insisted upon in the army proved its value in unmistakeable fashion. No matter what the weather or how deep the snow, the men were kept cheery and fit with skiing, toboganning, running on snow-shoes, snowballing and games of every sort, keeping free from that indescribable disease "cafard" which attacked some of the other contingents.

Outpost duty in such temperatures is exceedingly severe. There is a curious cracking of branches in severe cold, when the air is otherwise dead still, which gives the impression of unseen enemies marching all round one. In the dim light of the forest all shadows assume human shapes very quickly in the mind of a nervous watcher. Two

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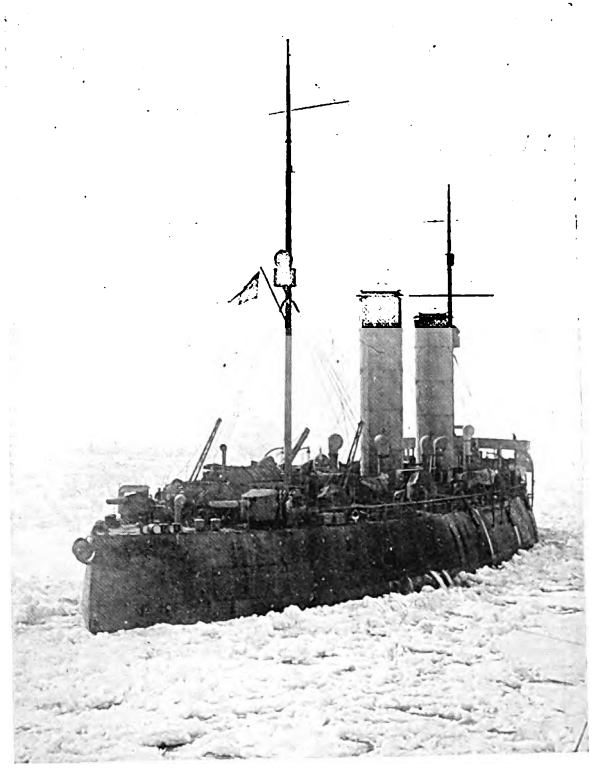
Winter Clothing.



One of the big Ice-breakers lying in broken ice in the White Sea.

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hours of double sentry-duty is quite sufficient for the ordinary man.

Accommodation at night is essential. Men cannot remain out in the open for long and must return for rest and cover. Fights were therefore short and sharp and conditions distinctly favoured the defence. Defensive positions were really laid out with a view to protecting your accommodation, and keeping it away from gunfire, for even the smashing of windows was a serious inconvenience. It thus came about that little nests of three blockhouses were pushed forward along the roads leading to the village chosen for occupation, being well hidden in the forest, in order to render them as immune as possible to observed gun-fire.

The location of blockhouses had to be carefully chosen, for if in very low ground they soon became smothered in snow, a second storey having to be built over the original house in order to secure a field of fire. In the same way, wire entanglements had to be very high or they became snowed up and with the snow hardening down below became quite useless as obstacles.

Sanitation was perhaps the most difficult matter to regulate. With so many different contingents, each with a different ideal of sanitation, it was easy for all to revert to the custom of the country—to open the house door for a second and to throw all the refuse of the house into the snow. This may have been all very well for a village where the population was normal, but with troops billeted upon the inhabitants the position became different. The shovelling up and carting away of the foul snow, before the arrival of the thaw, had to be insisted upon continuously during the winter.

Mobility in small wars is generally the key to success. Luckily for the Archangel Force, the Russian does not move far in the forest areas during the winter. He is not accustomed to fight against invaders and the troops of the Soviet Government may be said to have been actually at a disadvantage in respect of mobility. Had they possessed good ski-runners or men accustomed to snow-shoe work, the Archangel Force must have been driven back to their inner defences. Large quantities of skis and snow-shoes had been sent out from England with numerous instructors from French and Italian Alpini, but the largest quantity of these remained waiting on the quays at Murmansk and never reached their destinations. Skiing was found too difficult to teach in the time available and with

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the troops in the line continuously, so that the skis that arrived were divided up amongst the units for sports and for orderly and liaison work. Snow-shoeing, on the other hand, was found easy to teach. About 500 men, in two companies, were eventually raised and equipped as "coureurs des bois" and were successful in all the operations they undertook, being largely responsible for the quiet which reigned on our communications, for their fame spread after they had caught a few raiders. For forest work the snow-shoe was undoubtedly superior to the ski, but with either, a force of well-equipped men could have operated against a vastly superior enemy force of the class that opposed us with absolute impunity.

The sleighs employed were very simple and light. For hospital work a sort of cradle-like arrangement was built on to the ordinary chassis. Transport animals consisted of ponies, reindeer and dogs, the latter imported from Canada. Reindeer and dogs required special dumps of moss and dried fish respectively along the convoy routes and were eventually discarded, a few reindeer being retained for despatch and liaison work in the far north. Four reindeer will pull a light sleigh with two men at ten miles an hour for long periods at a time. They are driven with a pole something like a billiard cue and are harnessed with traces of uneven length so as to prevent their horns becoming entangled. The ponies were excellent, subsisting on 14 lbs. of hay and an occasional feed of oats. The hay served to fill the bottom of the sleigh and keep the cold away from the passenger, for in intense cold one requires as much below one as above. They are very hardy, for I have seen them going along with long icicles hanging from their nostrils, the driver only knocking these off at a halt and massaging the nostril for a minute. Convoys could be relied upon to cover 40 miles a day pulling a weight of 800 lbs. For despatch work, a pony would take two passengers and the driver 10-14 miles in about $1\frac{1}{4}$ to 2 hours according to the state of the snow. Breaking a fresh trail after heavy snow is always a tedious business, and the leading pony of a convoy has to be changed repeatedly. There was one notable achievement carried out by the Canadian artillery in transporting three 60 pdr. guns for a distance of 120 miles in 10 days. Loads were arranged as follows:—

The piece on one 10-horse sleigh.

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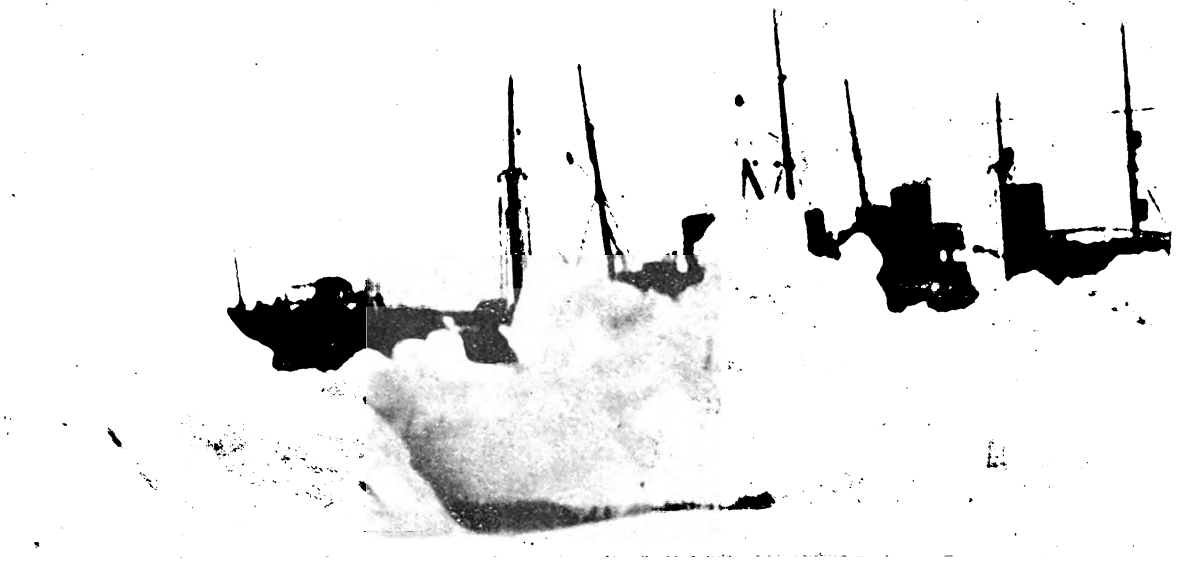

Ice-breakers breaking out ships in the White Sea.

Reindeer team and sleigh.

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The trail and carriage on one 10-horse sleigh.
The buffer on one 6-horse sleigh.
Each wheel on a 4-horse sleigh.

The sleighs were built in a very short time and were of ordinary pattern with the exception that the runners were strengthened with steel.

About 11,000 tons of stores were moved up by sleighs to the fighting columns during the winter, at the cost of £102,000. If one analyses these figures, the cost of moving a ton for an average distance of 100 miles, just over £9, seems very large. The question of how mechanical transport might have been substituted for this enormous mass of ponies and drivers was however carefully debated.

In the first place it would certainly not have been cheaper, for all the personnel for the mechanical vehicles, besides the vehicles themselves and their fuel, would have had to be imported by ship at a moment when shipping was difficult to come by, and the bill for wages would have in itself exceeded the total expended. Moreover, every European combatant who is introduced into the theatre of a small war is a potential cost to the subsequent pension account. But, also, the conditions were such that mechanical vehicles could only have been kept running with the utmost difficulty. A reconnaissance of the river-bed, after it had frozen, revealed the fact that its surface was impracticable for traffic of any sort. Being much exposed to the wind, the river froze at first in portions and the loose blocks of ice were then driven together into uneven masses which even the deepest snow could not level up. The wind, in fact, was our greatest enemy. Upon all exposed roads, great snow drifts, up to 30 feet in height, would spring up in a night. Even sleighs had difficulty in passing and wheeled vehicles could not get through. It would have been possible to have built a plank road as a main artery, at no great expense, since labour was cheap and logs abundant, along which lorries could have worked. But the clearing of such a road would have presented an even greater problem than it did in North Persia for the snowfall was much greater even if the winds were not so fierce.

Upon the sheltered forest tracks, leading down an endless avenue of trees, attempts were made to employ Fords. The track of the wheels was too great, however, to allow the Ford to follow

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the track made by the sleighs and so the pulling became extremely heavy, and in consequence the petrol consumption high. Had we possessed small cars fitted with Kegresse tracks behind and skis in front they would have been of great value for liaison work.

The running of motor transport upon any scale would have entailed the building of great wooden garages with special arrangements for warming them, the following example of the difficulties experienced with an aeroplane engine may give some idea of the conditions prevailing.

From the 6th December a D.H.4 was stored in a Bessaneau hangar and the engine kept warm day and night by means of flameless lamps and covers. On the 17th December the machine was brought out for flight and five gallons of hot water passed through the cooling system to take the chill off the metal. The drain cock froze up after two gallons had passed through and had to be taken out in order to allow the remainder of the water to be drained off. The engine was then filled with warm water and oil and gave 1575 revolutions steadily for three minutes. Upon attempting to slow down the engine, it was found that the throttle barrel was frozen and could not be moved by the control. Upon removing the barrel it was noticed that the air intake pipes and mixing chambers were covered with ice an eighth of an inch thick, also the exhaust gas release from the induction heating system was frozen solid to a depth of three quarters of an inch, due to condensation.

The effect generally of these low temperatures upon equipment and ammunition was most disconcerting, and it was only towards the end of the winter that we began to accumulate enough experience to gauge the modifications required.

At ranges of 2000 yards there was a loss of 8% in the range obtained from cordite. N.C.T. was not so badly affected in the cold, but deteriorated rapidly in the damp weather. Buffer oils were rendered passably efficient on a mixture of one part of turpentine to two parts of mineral oil. All lubricating oil had to be mixed with turpentine in the same proportions in order to remain unfrozen.

Machine gun operations were rendered difficult both from the effect of the cold upon the metal and from the fact that the men had to wear thick gloves at all times. Continual practice in these gloves was necessary to ensure even passable efficiency. All springs

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became extremely brittle and an increase of 50% spares was necessary. Even with the turpentine lubricating mixture the Lewis guns would freeze up, unfreezing being only possible with boiling water, which naturally could not be obtained out of doors. The water cooled guns were kept in use in blockhouses by employing a mixture of glycerine and water in the proportion of two to one. The following examples give a picture of the conditions. A Lewis gun was being fired when the order to cease fire and advance arrived. The gun number advanced 50 yards and then attempted to reopen, but found his gun frozen up. On another occasion a Vickers gun, which had been kept clear of all oil, opened fire, but had to cease fire after a few rounds owing to friction. After oiling slightly the gun refused to restart and within five minutes was completely frozen up, having to be boiled to unfreeze.

The health of the troops was exceedingly good and there was a complete absence of dirt in the wounds. If a wounded man could be got under cover within a reasonable time he had a better chance of surviving than in most other theatres. Exposure after a wound meant certain death from loss of vitality. The military contingents suffered little from scurvy owing to the excellence of the ration, but there were numerous cases amongst the civilians. Happily the medical authorities were ready to meet such an epidemic. Some distressing amputations were necessary amongst the Russian troops owing to frost bite, but no serious cases occurred amongst the British, whose trench training stood them in good stead. Only the strictest discipline and careful inspection of the men can prevent frost-bite.

The port of Archangel is situated 40 miles up the R. Dwina, a narrow fast-flowing river below Archangel, and after the freezing of the river, traffic is still maintained by means of icebreakers to Port Economy. From Economy a small line runs into Archangel, and thence across the frozen river to Bakaritsa. These ice-breakers are great round-bottomed vessels of immense horse-power which really crush the ice by their weight rather than cut it. In the White Sea, the wind again is the main difficulty to be contended with. If there is a North wind, the whole sea, and especially the narrow exit to the Arctic, the Gorlo, is blocked completely. Even the most powerful ice-breakers have to wait for a change of wind before they can free the ships they are breaking in.

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The finish of the winter is almost as sudden as its arrival. Well within a week the snow has completely disappeared and summer is in full swing. Grass, foliage and vegetation of all kinds grow at a surprising pace, and as the nights get shorter, one can almost see the things growing under the influence of 24 hours of sunshine. In the height of summer the sun does not go below the horizon and one can experience such a delight as a midnight rise of trout and salmon.

The first few days of the break were difficult from a military point of view. The rivers broke up with a great deal of terrifying crashing and all movement either by land or water was at an end for about 4 days, when the rivers became navigable once more. The water level rose as much as 20 feet, flooding much of the low-lying area round Archangel, and the sight of the great jagged masses of ice going rushing past was a magnificent one. All this mass accumulated in the White Sea, owing to the North wind, and although the break occurred early in April, the ships coming through the White Sea in June had to push their way through icebergs in bitter cold, arriving at Archangel to find a tropical summer in progress. As the rivers naturally cleared first in their upper reaches, the enemy was enabled to slip down and start shelling our positions with his gun-boats, knowing full well that it would be some days before our boats could get up from Archangel.

As soon as the waterways were going, all the winter kit had to be withdrawn and the summer kit issued, including mosquito nets and helmets. All troops were placed under canvas or out in the open and as far from the fouled winter quarters as possible. The greatest difficulty was experienced in getting the troops to abandon their insanitary winter manners and to get them to understand that there was no protecting frost and snow to prevent an outbreak of cholera and dysentery.

On the whole, the health of the men during the trying winter campaign was excellent. They were worked hard and therefore had little time to brood over the difficulties of the situation. The administrative arrangements made by the War Office, which was responsible for the clothing, equipping and feeding of all the contingents, were under the circumstances beyond praise. If the administration had failed, an international situation of some difficulty would have arisen, owing to the composite nature of the Force.

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Portraits of Officers mentioned in this Chapter.

2nd Captain R. W. GARDINER.
Circa 1820.
Died 26 June, 1864.

Captain (Bt. Major) JOHN MAY.
Brigade Major, Royal Artillery.
Circa 1816.
Died 18 May, 1847.

Lieut.-Colonel H. FRAMINGHAM.
Circa 1816.
Died 10 May, 1820.

2nd Captain (Bt. Major)
R. M. CAIRNES, R.H.A.
Circa 1814.
Killed in "action"—Waterloo,
18 June, 1815.

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THE SERVICES OF THE ROYAL REGIMENT OF ARTILLERY IN THE PENINSULAR WAR, 1808 TO 1814.

By MAJOR (BT. LIEUT.-COLONEL) J. H. LESLIE *(retired list)*.

CHAPTER IV. (1810.)

[NOTE. Chapters I, II, and III, were published as pamphlets, as here shown :—

Chapter I. (1808). H. Rees, Ltd., 1908. pp. 1-16.
,, II. (1808-9). ,, ,, ,, pp. 17-70. *map. ports.*
,, III. (1809). R.A. Institution, Woolwich, 1912. pp. 71-100.

Copies of these chapters are still available at the R.A. Institution.]

The chief "events" of the war in 1810, in which the Royal Regiment of Artillery took part, were the

Combat of the Coa—24 July
(Brigadier Robert Craufurd, in command),
and the
Battle of Busaco—27 September
(Lieut.-General Viscount Wellington, in command),

followed by the retreat of the allied armies within the defensive lines of Torres Vedras which, unknown to the French, had been constructed during the summer of that year.

During the year, the strength of the Royal Artillery in the Peninsula had been increased by the arrival of

1 Troop of Horse Artillery
and
8 Companies of Foot Artillery,

so that at the end of 1810 there were in Spain and Portugal

3 Troops of Horse Artillery, and
13 Companies of Foot Artillery.*

* See table on page 246.

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THE COMBAT OF THE COA—24 JULY.

The only unit which was present was "A" Troop, R.H.A.

1st Lieutenant D. M. Bourchier, of Captain F. Glubb's Company, 5th battalion, was also present, though it is not clear in what capacity.

Ross, in his description of the action, wrote :—

"General Craufurd ordered a retreat. Lieutenant Bourchier of the Artillery, brought me the order."

* * * * * * * *

"One waggon was overset, but by the exertions of McDonald and Bourchier, it was got safe off."

THE BATTLE OF BUSACO—27 SEPTEMBER.

The following table shows the R.A. Staff, Troops and Companies which were present.

Brigadier-General E. Howorth,[1] Commanding.
Lieut.-Colonel H. Framingham.[1]
Lieut.-Colonel W. Robe.[1]
1st Lieut. the Hon. W. Arbuthnott,[2] Adjutant to Lieut.-Colonel H. Framingham.
1st Lieut. L. Woodyear, Adjutant to Lieut.-Colonel W. Robe.

TROOPS—ROYAL ARTILLERY, HORSE BRIGADE.

TROOP.	COMMANDED BY	EQUIPMENT.	DESIGNATION IN 1924.
A	Captain H. D. Ross.[1]	5 6 prs., and	"A" Battery, R.H.A.
I	Captain R. Bull.[1]	1 5½ inch Howitzer.	"I" Battery, R.H.A.

COMPANIES—ROYAL (FOOT) ARTILLERY.

BATTALION.	COMMANDED BY	EQUIPMENT.	DESIGNATION IN 1924.
7th	Captain G. Thompson.	5 6 prs., and	18th Field Battery, R.A.
8th	Captain R. Lawson.[1]	1 5½ inch Howitzer.	87th Field Battery, R.A.

An excellent account of the battle, by Sir Charles Oman, appeared in Vol. 33 of the *Journal of the R.A.*—page 508—with map.

[1] Gold Medal (or clasp) for Busaco.
Silver Medal, with clasp, for Busaco.

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CADIZ.

The British Artillery, in and about Cadiz, consisted of 6 Companies (see page 246) which were under the command of Major Alexander Duncan who had arrived in Cadiz on 31 March, 1810.

Cadiz, at this time, was being besieged by the French. Fort Matagorda on the East (inner) side of the harbour was held by the French, having been evacuated by the Allies at the end of April.

Letters referring to artillery affairs at Cadiz are to be found in the Public Record Office (W.O. 55/1195-7), mostly from Duncan to the Deputy Adjutant General, R.A.

The position of affairs at Cadiz was not encouraging. Duncan wrote on 4 April :—

"I have been directed by General Graham[1] on my return from viewing the defences of the island of Leon, to report on the quantity of Artillery required for its defence, at the same time informing me, that he had already made a demand for four Brigades of Light Artillery Complete, and one Troop of Horse Artillery. Such a force of Artillery would certainly be of the utmost Service considering the great want of Field Artillery in the Spanish Army here. I am at the same time perfectly aware of the difficulty of procuring so great a supply from England, and should the Island be lost before its arrival, they would then be no longer of any use in the Defence of Cadiz. We are at present entirely without the means of acting with a Light 6 pounder Brigade, that was sent here from Lisbon, in consequence of the want of Horses. There are also two 3 pounder Brigades (English) belonging to the Junta. Captain Owen[2] gave a receipt for one of them, in hopes of being able to act, as Mules were promised, but as no such promise has been kept, the Brigade remains useless. The Great reason for the General being so anxious for a large proportion of Field Artillery is the total want of that arm in the Spanish Army, as I have already mentioned. What can be sent from England, I take the liberty of saying must be complete in Horses, Drivers and Camp equipage, and I fear we must in a great measure, if not entirely, depend on England for Forage; there is some idea of Constructing redoubts on or near the river St. Pietro. In that case a few Medium 12 pounders would

[1] Lieut.-General Thomas G., afterwards (1814) Lord Lynedoch.
[2] Humphrey Owen, R.A.

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be of great Service, at least twelve. I understand from General Graham that a large proportion of heavy Guns are on their way. I cannot conclude without informing you that the difficulties we meet with here, in the Ordnance Department *particularly*, are far beyond any conception."

During the year much progress was made with the erection and arming of redoubts in the outlying defences of Isla de Leon, despite the fact that scarcely any assistance was received from the Spaniards.

In a letter dated 25 April, 1810, Duncan expresses a hope that "the Spaniards will be more active than hitherto, in erecting batteries. Instead of exertions from them, we obtain *nothing* but conversation. . . . . The town is full of men *doing nothing.*"

On 5 July he reported that "The redoubts are far advanced" and on 22 August that "The redoubts at Isla are in much forwardness and will require 150 pieces of ordnance."

However, the French met with no success and no "affair" or "combat" in these parts has to be recorded—nothing except desultory firing from the Allied works against Matagorda Fort and the redoubts in its vicinity.

ROCKETS.

A detachment under the command of 1st Lieutenant W. F. Lindsay, R.A., with an equipment of Congreve's Rockets, reached Lisbon in November, 1810.

The following extract from a letter dated 9 October, 1810 (P.R.O., W.O. 55/1201, p. 134), from the D.A.G's Office, Woolwich, to Brig.-General E. Howorth, C.R.A. in Portugal, explains the situation.

"In the absence of Major General Macleod, I have to inform you that Lieut. Lindsay, two Non Commissioned Officers and twelve Gunners, are embarked in the *Charlotte*, Transport (105), for Lisbon, in charge of an Equipment of Congreve's Rockets. The Master-General having approved of their being employed on this Service, you will be pleased to afford Lieut. Lindsay such farther aid as may be requisite, and in your power."

Wellington (*Dispatches.* Vol. VI. Letters dated 3 and 6 November, 1810), had no especial liking for these rockets. Santarem

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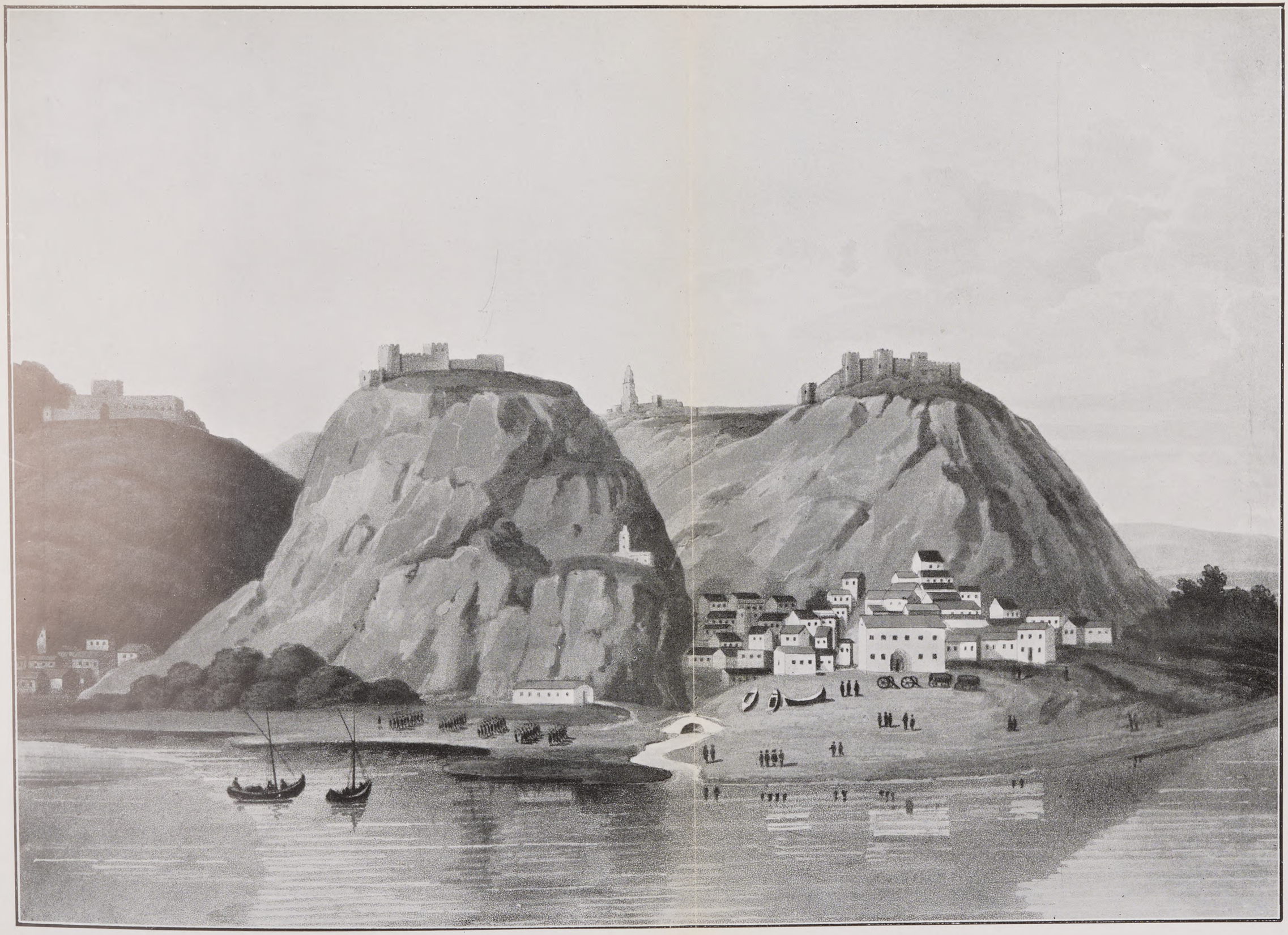

THE TOWN OF SANTAREM AS SEEN FROM THE SOUTH BANK OF THE TAGUS.

(From a coloured print published in London, by Edward Orme, in March, 1811. The Tagus is about 55 yards wide at this point.)

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N. Bank of the Tagus, occupied by the French, was "rocketed" [1] by Lindsay's detachment on 16 November.[2] The rockets were fired from the S. bank, across the river.

Major Alexander Dickson, R.A., at this time serving in the Portuguese Artillery, in a letter dated 29 November, 1810, at "Escaropim, 3 leagues below Santarem," wrote to Major-General J. Macleod, R.A., at Woolwich :—

"I have at this moment in my quarter Lieut. Lindsay, who is on his march to Lisbon with his rocket apparatus which he has been trying against Santarem. From what I can learn he only fired a few of the carcass rockets, and without much apparent effect, except putting to the route a large convoy of baggage, marching towards Golegam, amongst whom a rocket fell." (*The Dickson Manuscripts.* Series "C." pp. 303-4.)

Officers of the Royal Artillery serving in the Peninsula in 1810, whose names are given in the Monthly Returns, but who did not belong to any Troop, or Company, shown on pp. 246-7.

Lieutenant Colonel George Bulteel Fisher.

Major Thomas Downman. Reached Lisbon on 23 October, 1810, see letter from him dated 26 October, 1810, in Public Record Office, W.O. 55/1195. He returned to England on 21 December, 1810, on two months' leave.

Major Alexander Duncan. Reached Cadiz from England on 31 March, 1810.

Captain Richard Henry Birch. In command of a Company of the 10th Battalion, R.A., which left England on 27 February, and reached Gibraltar on 4 April, 1810. Birch, however, went out to Cadiz in the transport *Alert*, with Dickson's Company, 10th Battalion, and remained there in command of it until October, 1812, Dickson, during this period serving in the Portuguese army.

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[1] Only two instances of the use of the word 'rocket', as a verb, are given in the *Oxford English Dictionary*—both from Wellington's *Dispatches*.

[2] Diary of Lieutenant C. Gillmor, R.N., published in Vol. III (No. 13) of *The Journal of the Society of Army Historical Research.*

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2nd Captain Charles Tyler. Belonged to Birch's Company, 10th Battalion, R.A., He also went out in the transport *Alert*, with Dickson's Company, reaching Cadiz on 1 April, 1810, and there remained attached to it for duty. He went to England on sick leave in June.

1st Lieutenant Adam Fife Crawford.[1]
,, ,, Henry George Macleod.[2]
} Were in Portugal throughout the year. See Monthly Returns.

,, ,, William Fullerton Lindsay. Reached Lisbon in November, in charge of Rocket equipment. See *Dickson MSS.*, Series "C," p. 304.

ESTABLISHMENTS IN 1810.

Troop of Horse Artillery.		Company of Foot Artillery.	
1	Captain.	1	Captain.
1	2nd Captain.	1	2nd Captain.
3	1st Lieutenants.	2	1st Lieutenants.
2	Staff Serjeants.	1	2nd Lieutenant.
3	Serjeants.	4	Serjeants.
3	Corporals.	4	Corporals.
6	Bombardiers.	9	Bombardiers.
84	Gunners.	120	Gunners.
60	Drivers.	3	Drummers.
7	Artificers.		
1	Trumpeter.	Total	145
Total 171			
164	Horses.		

Books, etc., which relate to affairs of the Royal Artillery in this Chapter.

1. *The "Dickson" Manuscripts.* Series "C." Chapter II. The R.A. Institution, Woolwich. 1907.

[1] In charge of a "detachment", collected at Lisbon, awaiting embarkation for England. (Letter dated at Lisbon, 8 February, 1810, from Lieut.-Colonel G. B. Fisher, R.A., to the D.A.G., R.A., Woolwich. P.R.O., W.O. 55/1201. pp. 6-7). The "detachment" was, however, retained in Portugal.

[2] Silver medal with clasp for Busaco.

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2. *From Coruña to Sebastopol.* The history of "C" Battery, R.H.A. By Colonel F. A. Whinyates. 2nd edition. W. H. Allen & Co. 1893.

Note. A detailed account of the services of "D" Troop, R.H.A., from 1810 to 1816, is given in Chapter IV—pp. 55-68.

3. *Diary of Lieutenant W. B. Ingilby* (Lawson's Company, 8th Battalion), *R.A., in the Peninsular War. 1810-14.* Proceedings, R.A. Institution. Vol. XX, pp. 241-262.

4. *Memoir of Major Henry Bowyer Lane* (in Thompson's Company, 7th Battalion), *R.A.* By his son, Major F. W. Bowyer Lane, late 67th Regiment. J. H. Clark. Usk. 1883.

5. *Memoir of Field Marshal Sir Hew Dalrymple Ross,* G.C.B. ("A" Troop, R.H.A.). The Royal Artillery Institution, Woolwich. 1871. Pages 10-12 refer to the "Coa" and "Busaco."

6. *History of the Royal Regiment of Artillery.* By Major F. Duncan. Vol. II. Chapter XVI. John Murray. 1879. 3rd edition. 2 vols.

7. *Records of the Royal Horse Artillery.* By Lieut.-Colonel J. E. Mitchell. W. Mitchell & Co. 1888. 2nd edition.

Documents, etc., in the Public Record Office, Chancery Lane, London.

Artillery Letter Books	W.O. 55/1195. From Officers—Foreign. pp. 1-95. W.O. 55/1201. To Officers—Foreign. pp. 81-151.
Monthly Returns.	W.O. 17/2465.
Muster Rolls, R.H.A.	W.O. 10/788-9.
,, ,, Battalions.	W.O. 10/790 to 810.

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A List of Officers of the Royal Artillery, who were serving in the Peninsula in

from the Official Monthly Returns, and Muster Rolls now

3 Troops, Royal

Troop.	Designation in 1924.	Arrived in Peninsula.	Captain.	2nd Captain.
"A"	"A" Battery, R.H.A. (The Chestnut Troop).	July, 1809	Hew D. Ross[1]	George Jenkinson
"D"	"V" Field Battery, R.A.	March, 1810[3]	George Lefebure	Edward C. Whinyates[2]
"I"	"I" Battery, R.H.A.	August, 1809	Robert Bull[1]	W. Norman Ramsay

13 Companies, Royal

Battalion.	Designation in 1924.	Arrived in Peninsula.	Captain.	2nd Captain.
1st	2nd Field Battery, R.A.	March, 1809	John May[5]	Henry Baynes
2nd	4th Heavy Battery, R.A.	February, 1810	Patrick Campbell[6]	Arthur Hunt
4th	82nd Field Battery, R.A.	October, 1810[9]	James Hawker	William Latham
5th	17th Medium Battery R.A	March, 1809	Frederick Glubb	William G. Power
,,	9th Heavy Battery, R.A.	January, 1810[12]	Humphrey Owen	William Cator
7th	18th Field Battery, R.A.	March, 1809	George Thompson[14]	Henry B. Lane[15]
8th	37th Field Battery, R.A.	September, 1808	Andrew Bredin	Thomas Terrell
,,	87th Field Battery, R.A.	,, ,,	Robert Lawson[1]	John Taylor[17] Alfred Thompson[18]
,,	Reduced in 1819 and never reformed.	October, 1810[20]	Philip Meadows	John S. Byers[21]
9th	Ditto	January, 1810[22]	Philip J. Hughes	Francis Bedingfield
10th	16th Pack Battery, R.A.	March, 1810[23]	William Roberts	*Hon.* Herbert Gardner[24] Robert W. Gardiner[27]
,,	"B" Coast Battery, R.A.	April, 1810[28]	Alexander Dickson, [1, 29]	Robert M. Cairnes[30]
,,	Hd. Qrs., Golden Hill, Isle of Wight.	April, 1810[28]	William Shenley	Jonathan Mallett

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1810, shewing the Troops, and Companies to which they belonged, compiled in the Public Record Office, Chancery Lane, London.

Horse Artillery.

1st Lieutenants.			Station on 31 December.
Alexander Macdonald[2]	George J. Belson[2]	George B. Smyth[2]	Near Santarem.
William Dunn[2]	Thomas Carter[2]	Hugh Mallett	Lisbon[4]
Philip Stanhope	Charles Blachley	Hassell R. Moor[2]	Casal de Oiro[84]

Artillery (Foot).

1st Lieutenants.		2nd Lieutenant.	Station on 31 December.
William Elgee	John Pascoe[2]	Wiliiam Denniss	Alverca
Spencer P. Brett	Thomas Grantham	Arthur Carter[7] / Henry Pester	Isla de Leon (Cadiz)[8]
Peter Faddy	Thomas Trotter	William Henry Bent	Cabeço da Montachique[85]
Daniel M. Bourchier, [2, 10]	John G. Martin[11]	James Love	Torres Vedras
William Brereton[13]	George H. Mainwaring	Henry R. Wright	Cadiz
William C. Johnston	Robert Woollcombe	John Mercier / Frederick Bayly	Cartaxo
Hon. William Arbuthnott[2]	Bernard Wills	Francis Dawson	Alhandra
Henry Festing	James W. Johnston	William B. Ingilby[2, 19]	Alemquer
Richard B. Hunt	Eliott Seward	William Furneaux	Lisbon
John Maxwell	Charles Manners	Anthony R. Harrison	Isla de Leon (Cadiz)
William B. Dundas[25]	Rodham Home[26]	William Cozens	Ditto[83]
Philip J. Woollcombe	William A. Raynes[81]	Lynch Talbot	Ditto
Brownlow J. Maitland	Robert Godby[82]	Thomas O. Cater	Cadiz

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NOTES.

1 Gold medal (or clasp) for Busaco—7 awarded to R.A.

2 Silver medal with clasp for Busaco—13 awarded to R.A.

3 Embarked at Portsmouth on 12 February: half the Troop reached Lisbon in March, but the other half, owing to bad weather, was nearly lost at sea, and did not arrive until May. The Troop was reduced in 1816. Reformed in 1900, as "V" Battery, R.H.A.

4 "D" Troop was in Lisbon, being refitted after its disastrous voyage from England. Whinyates, Carter and Dunn were doing duty with "A" and "I" Troops. 5 Brigade Major, R.A.

6 Commanding a regiment in the Spanish Army with rank of Lieut.-Colonel. Went to England on 11 November, 1810.

7 In England. Promoted on 22 January.

8 Arrived from Gibraltar in February.

9 Embarked at Plymouth, 30 September, 1810, in the transport *Eliza*, reaching Lisbon on 19 Oct. and disembarking on the 23rd.

10 "On command," with the Army.

11 Died at Castello Branco, in Portugal, 30 August, 1810, being then attached for duty to Captain G. Thompson's Company, 7th Battalion.

12 Embarked at Portsmouth on 2 January; reached Lisbon on the 29th, and disembarked on the 31st. Re-embarking on 7 February it proceeded to Cadiz, where it disembarked on the 13th. See Captain Owen's letter, dated at Cadiz, 13 February, 1810. P.R.O., W.O. 55/1195, p. 7.

13 Joined the Company at Cadiz in April.

14 Joined the Company in June, 1810, from England.

15 Sick-leave to England, March to September.

16 Joined the Company in September, *vice* Mercier, who had remained in England.

17 In Paris, a prisoner of War. Wounded at the Battle of Talavera, 27 July, 1809, and taken prisoner.

18 Joined the Company from England in August, *vice* Taylor, struck off the strength.

19 Joined the Company from England, 25 September.

20 Embarked in the *Thetis* transport, on 30 September, 1810.

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Reached Lisbon on 19 October and disembarked on the 23rd.

[21] In the East Indies.

[22] Embarked in January and reached Lisbon early in February. Proceeded thence by sea to Cadiz, disembarking there on the 6th.

[23] Embarked at Gravesend on 27 February, 1810 (4 Officers and 112 other ranks), disembarking at Cadiz on 1 April.

[24] Remained in England, then being A.D.C. to Lieut.-General the Earl of Chatham. Transferred to 3rd Battalion, 1 June, 1810.

[25] To England on sick leave, 22 August, 1810. Left England on 13 November and did not reach Cadiz until 4 April, 1811, having been 76 days on shore at Lisbon, en route.

[26] Embarked at Cadiz for Portugal, 10 September, 1810, and was lost at sea on 26 February, 1811, while on passage from Portugal to England.

[27] Joined the Company at Cadiz on 31 May, 1810, from the 3rd Battalion. Prior to his arrival, 2nd Captain H. Light had been doing duty with this Company. He belonged to Reynell's Company, 5th Battalion, stationed at Malta, and was on his way from England to join it. He left Cadiz for Malta in June, 1810.

[28] Embarked at Woolwich in the *Alert* transport, No 140, on 26 February, 1810, disembarking at Cadiz on 1 April.

[29] Serving in the Portuguese Army with the rank of Major. Captain Richard Henry Birch, 10th Battalion, R.A., was attached to and in command of Dickson's Company, until October, 1812, when he joined his own Company at Gibraltar.

[30] Joined the Company at Cadiz on 31 May, 1810.

[31] 1st Lieutenant Henry Pester, of Captain G. Dodd's Company, 2nd Battalion, R.A., came out with Dickson's Company in the *Alert* transport, and was attached to it for duty until W. A. Raynes joined in June. [32] Died at Cadiz, 26 October, 1810.

[33] This Company was disbanded on 4 December, 1919, then being No. 60 Company, R.G.A. Its records, history, etc., were taken over by 22nd (M) Batt. 22nd (M) Batt. converted into 16th Pack Batt., R.G.A., 1.3.21.

[34] About 6 miles below Santarem—N. bank of Tagus.

[35] About 13 miles, N.N.W., from Lisbon, towards Torres Vedras.

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THE EVOLUTION OF ARTILLERY IN THE GREAT WAR.

By Bt. Lt.-Col. A. F. Brooke, d.s.o., *p.s.c.*, Royal Artillery.

1. ARTILLERY SITUATION IN 1914.

THE following articles were originally prepared as a series of lectures for the purpose of examining the evolution of artillery during the Great War, and with the object of drawing deductions as to the general artillery lessons of the war.

As the lectures were delivered to officers of all arms of the service, technical subjects were purposely avoided, and have only been considered when they directly affected tactical considerations.

The short survey of the evolution of artillery prior to 1914 lays no claim to originality, and is based almost entirely on statements contained in Maj.-Genl. E. A. Altham's "Principles of War," and Maj. E. S. May's "Achievements of Field Artillery."

In a similar manner Colonel H. A. Bethell's "Modern Artillery in the Field" has been freely consulted in the preparation of the notes concerning the situation existing in 1914.

1. Artillery Evolution up to 1914.

In order to be in a position to follow the Evolution of Artillery during the War of 1914-18 it is necessary in the first place to examine the broad lines of evolution up to 1914, and in the second place, to carry out a general survey of the Artillery situation as it existed in 1914. We shall then be provided with a suitable foundation on which to build up the successive stages of the Evolution of Artillery during the Great War.

It will be sufficient for our purpose if we start our examination of the past with :—

(a) *The Napoleonic Wars.*

Here we find forces armed with an equipment which was but little use at ranges exceeding 1000 yards and which was obliged to approach within 300 or 400 yards of the enemy in order to obtain decisive results.

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Napoleon was quick to realise that the effect of artillery power varies in direct ratio to its concentration, and that the fundamental principle of "superiority of force at the decisive point" applied to artillery fire power in the same manner as to the other arms.

But with a short ranging gun concentration of fire power could only be arrived at by a concentration of actual guns, we therefore see Napoleon making full use of massed artillery in the majority of his battles.

The short ranging powers of the equipment affected the tactics in yet another way. The control of artillery committed to action within some 500 yards of the enemy was temporarily lost, and it was impossible to count with any certainty upon employing these guns elsewhere during the same battle. We therefore find during the Campaign of 1813-15 nearly half the batteries of an army organised as "Reserve Artillery" and kept in hand on the battle-field until the moment for decisive action was believed to have arrived.

The two main features to be remembered for this period are :—

I. The employment of massed artillery.
II. The employment of a large "Reserve of Artillery."

The latter is of particular interest when compared with the employment of a reserve of artillery in the latter stages of the Great War.

The next period worth examining is :—

(b) *The Campaign of 1866.*

Artillery equipment had considerably improved during the last 50 years. The Prussian Army had, for the most part, been equipped with rifled guns with ranges from 2000 to 4000 yards.

But tactical ideas had not kept pace with material improvements. Conservatism clung to the letter of the Napoleonic system and stuck to the employment of large reserves of artillery, no longer so necessary owing to the increased facilities for control provided by longer range. As a result guns rarely came into action sufficiently early, and never in sufficient numbers. At all the big battles this defect was so apparent that it engendered "widespread discontent" in the Prussian Army.

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The main lesson of this period lies in the necessity for the evolution of tactics to conform to the evolution of material.

We may next turn to :—

(c) *The Campaign of 1870.*

The lessons of 1866 were taken to heart by the Prussian General Staff, and bore good fruit in 1870. The term "Reserve of Artillery" and all that it implied was utterly swept away. The batteries formerly so organised were assigned to the Corps Artillery. The guns no longer marched at the tail of the columns but as near to the head as was compatible with safety. As soon as contact was gained with the enemy, as many batteries as possible were brought into action immediately in order to prepare the way for the infantry.

The tactical principles accepted in 1870 may be conveniently summarized as under :—

I. As many batteries as possible to be brought into action at the very outset of the battle, their primary objective being the enemy's guns. "The artillery duel thus formed the beginning of the decisive action."

II. Batteries concentrated in large groups, each group attacking a separate target, under the direct supervision of a senior officer.

III. Normal position of artillery, that which affords the best view, i.e., crest of the heights.

IV. As soon as hostile guns are silenced, or contained, the hostile infantry becomes the objective. In later stages portion of the artillery to push forward regardless of loss, to within close range of enemy's infantry, and thence support its own attacking infantry.

The above principles still remained more or less unimpugned at the outbreak of :—

(d) *The Boer War.*

Owing to abnormal conditions, and the small number of guns with which the Boers were armed, this war is not very fruitful in lessons on artillery tactics. The following points are, however, worthy of note :

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1. The employment in the field of heavy guns and howitzers.
2. Smokeless powder accentuates difficulties in locating targets.
3. Rarely does the Boer allow himself to be dragged into an artillery duel, preferring to cease fire and reappear elsewhere.
4. Initial steps towards obtaining concentration of fire from dispersed guns.
5. The infantry's need for artillery support up to the moment of assault repeatedly made clear.

The following extract from the official History, South African War, Vol II, referring to the successful action of Pieters Hill is of special interest when compared with similar sentiments expressed during the Great War. :—

> "The gunners supported the attacking infantry to the very last moment, and the infantry had so thoroughly realised the importance that the ground over which they had to advance should be swept by artillery fire, that they were known to grumble if our shells were not constantly bursting in front of them as they moved forward to the attack."

(e) *Russo-Japanese War.*

The Japanese Artillery tactics were primarily based on the lessons of 1870, but in several respects they shewed definite growth.

One of the most striking faults in the tactical handling of the German artillery had been taken in hand, namely the lack of central control. In 1870 batteries were brought into action in a haphazard manner on the initiative of the local commanders, and at times in contravention to the original intention of the Headquarters General Staff.

In the Russo-Japanese War the guiding hand of the Supreme Command is apparent in the handling of the artillery.

The next point worth noticing is that this higher control was facilitated by the fact that Headquarters Staff and Army Staffs had at their disposal artillery units additional to, and outside, the divisional organisations. It should be noted that the tendency in European armies had of late been to strengthen the divisional artillery and abolish all extra-divisional artillery units

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The possibility of obtaining concentration of artillery fire with dispersed batteries was fully demonstrated by the Japanese, and especially during the battle of the Sha-ho.

We find distinct growth in the germ of concealment, most engagements provide ample examples of the advantages scored by concealed batteries, but the increased difficulties in the control of fire of such batteries is also realised.

Old conceptions of artillery close support must necessarily be readjusted to meet the increased efficiency of small arms fire. Guns pushed forward into the firing line fail owing to neutralisation by rifle fire.

This war provides very distinct examples of requirements of ammunition in modern battles, at Lamuntun during the battle of the Sha-ho 48 Russian guns fired 8000 rounds in forty minutes (i.e. 166 rounds per gun), whilst at Ta-shih-chi another battery actually fired 501 rounds per gun. It is interesting, however, to note that this lesson was misapplied, and we find as a result further stress laid on the necessity for economising ammunition instead of endeavouring to increase supplies.

Finally the Russo-Japanese war is of interest in providing examples of the employment of heavy artillery in the Field. At the Battle of Liao-yang we find the Japanese employing 56 heavy guns and mortars out of a total of 470 guns.

We therefore found ourselves on the eve of the Great War with five main problems to be solved, namely :—

I. The problem of the supply of ammunition in future wars.
II. The possible use of heavy artillery in the field.
III. The possibility of maintaining guns in the open against modern armaments, combined with the difficulties of providing adequate support from covered positions.
IV. The advisability of organising higher artillery commands to co-ordinate the action of artillery.
V. The imperative necessity of adequate systems of intercommunication both as regards command and control of artillery fire.

We shall now turn to examine the situation as it existed in 1914 and see to what extent steps had been taken to provide for the above requirements.

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2. Artillery Equipment in 1914.

In the first place let us examine briefly the various equipments with which the main powers in the Great War were armed.

(a) *England.*

In the case of England we find the expeditionary force armed with :—

18 pdr. guns.
4·5″ howitzers.
60 pdr. guns.
6″ howitzers (forming part of the siege train).

The first three of the above equipments varied only very slightly from those used throughout the war and require no detailed examination.

It should, however, be noticed that both the 18 pdr. and the 4·5 hows. proved themselves as thoroughly suitable weapons, and it is considerably to their credit that they have stood the test of such a war.

(b) *France.*

The French equipment consisted of :—

The famous 75 and a 65 mountain gun.

The above provided the field artillery equipment whilst the heavy artillery equipment consisted of :—

155 short (1904 model).
120 short Baquet.
120 long le Bange (1878 model).

(c) *Germany.*

The German equipment consisted of the following :—

Field Artillery :—
77 gun.
105 how.

Heavy Artillery :—
10·5 gun.
13 gun.
15 how.
21 how.

In addition heavy siege equipment.

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(d) *Comparison of Equipments.*

As regards the actual field guns, no striking divergence of opinion existed, as shewn by attached comparative table (Appendix "A"). We had adopted a somewhat heavier weapon in the 18 pdrs. and the accuracy of our selection was borne out by the war.

The most striking defect in all the equipments was lack of ranging power, a defect which we shall see soon made itself felt. The reason for this defect becomes apparent when the tactical doctrines prevailing in 1914 are taken into account.

The next point worthy of comment is the lack of a field howitzer in the French equipment. This was due to the boundless reliance placed by the French in their efficient 75 field gun.

A distinct school existed in France favouring the adoption of a field howitzer, and various equipments had been designed with a view to their adoption, but unfortunately for France at the critical moment in the experiments a certain Capitaine Malandrin invented "plaquettes" by means of which the trajectory of a 75 could be given greater curvature. The invention was unsound from a ballistic point of view, but of course far cheaper, and, as financial considerations predominate in peace, the field howitzer was abandoned.

It is further interesting to note that although the French faith in their famous 75 was indirectly responsible for the rejection of the field howitzer, the German fear of the 75 was directly responsible for the adoption of a field howitzer by Germany who realised that the best antidote for this threat lay in the use of high angle fire.

Finally the question of heavy artillery equipments requires to be taken into consideration. The actual types of equipment do not call for much comment and did not vary to any marked degree, being for the majority approximately 4″ guns and 6″ hows. with the exception of the German 8″ how. We shall, however, see when studying the respective organisations, that considerable differences existed as to the numbers of these equipments.

The Russo-Japanese War had provided frequent lessons concerning requirements in heavy artillery for modern war, yet we were slow to appreciate these lessons and inclined to bury our heads in the sand like the proverbial ostrich. The idea appears to have been held by us that only artillery which could be landed on an open

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beach was permissible with the field army. The possibility of employing the 6″ how. for duties in the field in addition to its normal siege duties was allowed for in Garrison Artillery Training, but never taken seriously.

Since time immemorial the tendency has been to seek mobility during times of peace and to shout for shell power during stress of war. It is consequently not surprising that heavy artillery made little headway before the test of war, especially when financial limitations are taken into account.

Germany, on the other hand, faced with a definite problem on her Western frontier, entailing the reduction of modern fortresses, had devoted considerable attention to the production and employment of heavy artillery. Although the necessity for such artillery for seige work was undoubtedly the primary cause for its advanced state of evolution, yet the Germans were quick to realise the value of such material for other purposes.

Realising the difficulties entailed by an infantry advance against modern fire power, especially quick firing field guns of the nature of the French 75, they decided in designing a proportion of their heavy material so as to be able to perform the double functions of assisting the field army and participating in siege operations.

In France a heated controversy had existed since 1904 on the subject of the employment of heavy artillery in the field. The main opposing factors in these arguments rested on the implicit faith of the 75 field gun being suitable for all tasks, counteracted by uneasiness caused by the German heavy artillery armaments.

General Herr, Commanding the artillery of the VI French Corps, after a visit to the Balkan theatre of war in 1912, reported his firm conviction that :—

> "Heavy long ranging artillery was an indispensable arm in modern battle, that this arm should act in constant "liaison" with the field artillery." and that consequently it should be organised as a Corps artillery.

This report is said to have caused a considerable flutter in the French Military and Parliamentary dove cotes, resulting in heated arguments which were finally settled by a paper issued by the French General Staff in 1914.

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In this paper the arguments against heavy artillery were again enumerated, followed by a comparison between the French and German field guns, backed by the assertion that the few batteries of heavy artillery possessed by the French would be quite capable of replying to the German heavy artillery on the very rare occasions when the 75 would be unable to deal with them.

The following sentence concluded the argument :—

> "A mobile artillery, capable of making good use of ground, will seldom require a long ranging gun to place itself within effective range of the enemy."

General Herr in his book sums up the situation as under :—

> "The theory of the preponderating power of 'manœuvre' over 'fire' was thus definitely applied to the artillery."

3. Artillery Organisation in 1914.

(a) *England.*

At the beginning of the war the artillery of a Division consisted of :—

3 Brigades R.F.A. (consisting of 3 batteries of 6 18 pdrs.).
1 Brigade R.F.A. (consisting of 3 batteries of 6 4·5 howitzers).
1 60 Pdr. Battery, R.G.A. (4 60 pdr. guns).
Namely a total of *54 18 pdrs., 18 4·5 hows., and 4 60 pdrs.*

In addition to the above six 4 gun 6″ how. batteries were formed on mobilisation by the expansion of R.G.A. companies, and formed part of the official siege train.

The above, however, were only intended to cover the requirements of the 6 Divisions of the Expeditionary Force, and we find the 7th and 8th Divisions armed with an odd lot of guns as under :—

1 Bde.	13 prs.	2 Batteries (6 guns)	12	13 prs.
2 Bdes.	18 prs.	3 Batteries (6 guns)	36	18 prs.
1 Battery	4·7 gun.		4	4·7 gun.

The 13 prs. were intended to replace 18 prs. whilst the 4·7 guns were intended to make good the lack of reserve of 4·5″ hows.

Again the Meerut and Lahore Divisions from India were on a different establishment lacking 4·5″ hows. and consisting only of 54 18 prs. per division.

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As regards the question of Command the composition of the Expeditionary Force called for no higher artillery control than the Div. Artillery Commander, and the Staff Manual of War, 1912, makes no reference to staff duties in connection with artillery other than a brief note on the duties of the Staff of Headquarters, Divisional Artillery.

An "Artillery Adviser" was borne on the establishment of G.H.Q. (Major General, R.A.) and also on that of Corps, directly the latter were formed.

The duties of these Advisers was purely advisory. They had no staff and the adviser with the corps had not even a clerk of his own.

(b) *French.*

The French Artillery was organised as under:—

20 Regiments of Corps artillery each consisting of 4 "Groupes" of 3 Batteries, each consisting of 4 75 (48 guns).

65 Divisional Artilleries each of 3 "Groupes" of 75 for the 1st line divisions and 2 "Groupes" for 2nd line divisions. (36 guns for 1st line and 24 for second line divisions.)

In addition—5 Regiments of Heavy artillery of 4 groupes each.

2 Regiments of Mountain artillery.

11 Foot Regiments.

A few Territorial formations.

For total number of guns see Appendix B.

Artillery Command was organised at Corps and Divisional Headquarters, but not at Army Headquarters.

(c) *Germany.*

Each 1st Line Division was provided with 2 Regiments of Artillery, comprising in all

3 Groupes of 3 batteries of 6—77 and

1 Groupe of 3 batteries of 6—105 hows.

(54—77 guns and 18—105 hows.).

2nd Line Divisions were only provided with one Regiment.

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In addition each Corps comprised one battalion of 3 batteries of 4—15 hows. (namely 12—15 hows.) and each army was provided with a verying number of 21 hows.

The whole of the above artillery was normally brought into action under Divisional Control, and no form of Artillery Command was provided either at Army or Corps Headquarters.

(d) *Comparison of Organisation.*

As will be seen from the above no radical difference existed in the organisation of the three countries.

The following points are, however, worthy of note in view of our future study of the evolution of artillery organisation.

1. Both England and Germany had adopted the same number of field guns and howitzers within the Division, namely 54 and 18. The French on the other hand had only provided 36 field guns with the Division, but compensated for this deficiency by a Corps allotment of 48 guns, which could increase the divisional allotment to 60 in a 2 Div. Corps (or 52 in a 3 Div. Corps).

2. Both England and Germany had adopted 6-gun batteries whilst the French favoured 4-gun batteries.

3. All three countries provided for an Artillery Commander within the Division, but France alone had allowed for such a Commander at Corps Headquarters.

4. Artillery Tactics in 1914.

(a) *England.*

Space will not admit of our going into details of minor tactics, it will, therefore, be sufficient to select a few of the most salient points in the artillery tactics of 1914.

1. *Mobility.*

Our conception of war was naturally based on former wars and experience gained during manœuvres, field days and tactical exercises. The former provided no true indication of the effect of fire power as delivered by modern weapons, whilst the latter evidently could not produce any effect of fire power.

It is, therefore, not surprising that in 1914, as in all periods of peace, tactical doctrines favoured the power of mobility to the detriment of fire power.

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We therefore prepared for a highly mobile nature of war, and consequently framed our artillery tactics and organisation to meet the requirements of such a war.

In the first place the higher centralisation of command of the artillery was rendered either impossible or unnecessary in the nature of operations contemplated. We consequently find no higher artillery commander than the C.R.A. of the Division; and even the Divisional C.R.A. only exercised direct command over his artillery brigades in exceptional circumstances.

Decentralisation was the rule and centralisation the exception.

2. *Artillery still an accessory and not a necessity.*

The next point of importance is the fact that artillery as an arm had not yet outgrown the "Accessory Stage." The value and importance of artillery support in battle had been fully exemplified in 1870 and in the Russo-Japanese war, and there existed a distinct tendency at times to attribute considerable importance to it as an accessory, but it had not yet been clearly recognised as a necessity in modern battle.

We consequently find in our tactical teachings of 1914 the artillery detailed to support the infantry action by providing assistance where and when required.

Artillery commanders must render themselves thoroughly familiar with the infantry plan of action, then watch the course of events, and come to the assistance when required.

There is no question of a combined plan of attack for the two arms, it is a question of an infantry plan assisted to the best of its ability by the artillery.

Since the rôle of artillery is, and always has been, that of assisting the infantry, the doctrine appears entirely sound on first examination.

On close inspection it will, however, be seen that modern evolution in fire power had considerably affected the method by which artillery could provide the support required of it.

3. *The Artillery Duel.*

In the opening phase of the attack the artillery was expected "to locate the enemy's batteries and, by subduing the fire of those in action, to support the infantry," ("F.A.T." 1914, Sec. 155).

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This is still a relic of the artillery duel of 1870. But since the Franco-Prussian war the importance and value of the covered position had been rapidly growing.

To locate and subdue concealed hostile artillery battery positions is a lengthy process requiring special counter battery organisation and hardly in keeping with the prevailing ideas of the 1914 mobile war.

This tactical doctrine can therefore only have been based on the pious hope that batteries would continue to occupy open positions.

The uncertainty of being able to neutralise the hostile artillery, however, had a serious bearing on the question of the final phases of the attack as we shall now see.

4. *Support of Infantry advance and assault.*

We have seen that the underlying principle of artillery tactics was to "help the infantry to maintain its mobility and offensive power" ("F.A.T." 1914, Sec. 145), and that to perform this duty the artillery must first fully acquaint itself with the infantry plan of attack.

"F.A.T." 1914, Section 156 states as a next step that—"During the progress of the fight it will usually become necessary for the artillery to move forward to positions from which it will have a clearer view of the infantry fight and thus be able to afford to the infantry more effective support, especially against local counter attack."

And further:—"To support an attack with success a battery commander must be able to see the ground over which the infantry is advancing and also be able to control the fire of his battery rapidly and effectively, but the more cover that can be obtained compatible with *control by voice* the better."

From the above quotations it is clear that the close support of the actual guns, and not only of their fire power, was contemplated; but such a support could only be hoped for after the hostile artillery had been thoroughly subdued, and as we have seen the chances of achieving this result was improbable.

(b) *France.*

If England may be accused of being somewhat "mobile mad" in 1914, France was certainly suffering from the same complaint to a more marked degree.

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We have already seen that in 1914 the French Staff had definitely asserted the "preponderating power of manœuvre over fire as applied to artillery" when refuting arguments in favour of the employment of heavy artillery in the field.

We cannot do better than examine General Herr's summing up of the French doctrines of artillery tactics in 1914 as contained in the book he has just published "L'artillerie, ce qu'elle a été, ce qu'elle est, ce qu'elle dôit être."

He states:—

"The war will be short, and of rapid movements, where manœuvre will play the predominating part: it will be a 'war of movement.'

The battle will be primarily the struggle between two infantries, where victory will rest with the battalions: the army must be an army of personnel and not of material.

The artillery will only be a accessory arm, with only one task: to support the infantry attacks. For this task it will only require a limited range, and its first quality must be its rapidity of fire to admit of its engaging the manifold and transitory targets which the infantry will disclose to it.

The obstacles which one will meet in the war of movement will be of little importance: field artillery will have sufficient power to attack them.

In order to follow as close as possible the infantry to be supported, the equipment must be light, handy and easy to manœuvre. The necessity for heavy artillery will seldom make itself felt; at all events, it will be wise to have a few such batteries, but these batteries must remain relatively light in order to retain sufficient mobility, which precludes the employment of heavy calibres and powerful equipments.

A battery of four guns of 75 develops absolute efficiency on a front of 200 metres, it is consequently unnecessary to superimpose the fire of several batteries; it will be unnecessary to encumber oneself with an over numerous artillery, and it will suffice to calculate the number of batteries required to allot to the organisation of formations according to their normal front of attack."

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This is actually the manner in which the allotment of artillery to divisions and corps was settled. Namely the corps of 2 divisions was considered as normally attacking on a front of 4 to 8 k.m. taking 6 k.m. as the mean and 200 m. as the frontage per battery, an allotment of 30 batteries was given to the corps.

(c) *Germany.*

Germany as we have already seen when considering questions of organisation was not suffering so seriously from "mobile madness" as her enemies.

The Germans also anticipated a short war of movement, on the general lines of the campaign of 1870, and had absolute faith in the superiority of the offensive.

But their tactical doctrines were better balanced in connection with the relative merits of manœuvre and fire power, and they appreciated better the dependence of movement on fire power.

They appreciated the essential value of manœuvre but recognised that in modern war manœuvre can only be ensured by developing fire power.

We consequently find them providing field howitzers to counteract the delaying action on their mobility which the French were endeavouring to produce by means of the 75. Again we find them provided with heavy artillery accompanying the field army to counteract the advantages provided by hostile obstacles and covered fire.

The following extracts from the "Drill Regulations for the Field Artillery of the German Army" will assist in completing the general conception of German tactics in 1914.

"At the decisive stages of the combat the artillery will almost always have to renounce the advantages of concealed positions to come into action in the semi-concealed position or in the open."

From the above it is clear that the Germans, unlike the French, intended to make considerable use of concealed positions, since batteries are only called on to leave these positions "at the decisive stages of the combat."

Finally the following paragraph shows that the haphazard methods of employing artillery in 1870 had been improved on.

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"The larger the force of artillery the more important it is that complete control of its fire should be in the hands of the artillery commander. The idea is that the full fire power of every battery is used to the best advantage."

We thus find them not only recognising the value of fire power in modern battle, but also the necessity for careful co-ordination of such fire.

5. Artillery Ammunition Supply in 1914.

Before finishing our review of the artillery situation in 1914, there are still two points which are worthy of our attention.

The first is the situation in 1914 as regards the supply of artillery ammunition, and the second the system of artillery inter-communication.

The tactics of artillery are fundamentally affected by the system of ammunition supply and it is, therefore, necessary that we should examine what provisions have been made to meet requirements.

(a) *England.*

When war was declared the authorised stocks kept in accordance with the Mowatt Reserve (modified) were as follows :—

18 pr.	1300	rounds	per	gun	for	324 guns.
13 pr.	1900	,,	,,	,,	,,	30 ,,
4·5 How.	1200	,,	,,	,,	,,	108 Hows.
60 pr.	1000	,,	,,	,,	,,	24 guns.

Subject to the proviso that the following additional supplies should be available at the end of the first six months of the war :—

13 pr., 18 pr. and 60 pr.	500 r.p.g.
4·5 How.	400 r.p.g.

It was a recognised fact before the war that the 18 pr. could maintain a rate of fire of 4 r.p.g. for limited periods, and yet the total reserve for the first 6 months equalled some 5 hrs. 25 mins. fire at this rate and allowed for a daily expenditure of 7·2 rds. per day for the first 6 months of the war ! ! !

These figures in themselves provide a good example of the "accessory" role allotted to the artillery.

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They are also of special interest when considered in connection with the following paragraphs of F.A.T. 1914 bearing on the attack:—

"A battery engaging infantry should by bursts of fire endeavour temporarily to disturb the enemy's aim and reduce the volume of his fire . . . . These bursts of fire should become more frequent and intense as the infantry approaches the enemy's position.

Covered in this manner by the fire of the artillery the infantry approaches nearer and nearer the enemy till it reaches a point from which it is possible to assault . . . .

The bursts of artillery fire should become frequent and intense at this period, the object of the Artillery being to demoralise the defenders and reduce the volume and effect of their fire so as to afford the infantry the opportunity to assault, etc."

(b) *France.*

The French situation was even worse except for the fact that the total number of guns available and under consideration allowed for more margin.

The reserves of ammunition for the 75 amounted to 1300 rounds per gun, backed by a daily output from factories of 13,600 rounds (which only equal an allowance of from 3 to 4 rounds per gun).

(c) *Germany.*

The German reserves for their field guns only amounted to 800 rounds per 77 gun, backed by the output from factories.

6. Artillery Inter-communication in 1914.

Finally it is advisable to examine the system of artillery inter-communication existing in 1914.

The telephone as a means of inter-communication in the field had made rapid strides during the few years prior to the war, but still left a great deal to be desired, not so much from the point of view of quality as from that of quantity.

Both as regards instruments, wire and personnel supplies were totally inadequate to admit of the full artillery power available being developed.

The French were even worse off being provided with an instrument unsuitable for inter-communication at distances longer than

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1000 metres, and only provided at the rate of 2 instruments and 500 yards of wire ! per "Group" headquarters and per battery.

The reason for this deficiency of telephone material sprang from the fundamental doctrines of the mobile war; and yet in our manuals of 1914 repeated reference is made to the importance of a reliable system of inter-communication for the artillery both for control of fire and liaison with the infantry !

CONCLUSION.

This completes our brief summary of the artillery situation on the eve of the Great War. We have only had time to touch on a few of the main points of interest. This should, however, be sufficient to act as a foundation on which we can, in subsequent articles gradually build up the evolution of artillery during the war.

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Appendix "A"

COMPARATIVE TABLE OF FIELD GUNS.

		England	France.	Germany.
Weight of shell	lbs.	18·5	16	15
Muzzle velocity	f.s.	1610	1740	1525
Calibre	inches.	3·3	2·95	3·03
Weight of gun in action ...	cwt.	24·7	22·4	18·6
Rounds in Limber		24	24	36
Weight of gun and limber ...	cwt.	40	37	34·5
Men carried		2	3	5
Weight of gun behind team with gunners and kit ...	cwt.	43	41·5	42
Rounds in wagon		76	96	88
Men carried in wagon		4	5	5
Maximum range (approx.) ...	yds.	6000	6500	7000

(The above is reproduced from Colonel H. A. Bethell's "*Modern Artillery in the Field.*")

Appendix "B"

APPROXIMATE NUMBER OF GUNS IN 1914.

Nature of Equipment.	England.	France.	Germany.
Field gun	480	2840	4150
Field howitzers	86	—	1350
H.A. intended for field army ...	52	308	2000
Siege artillery	16	380	? ?
Total	634	3528	7500

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DEFLECTIONS IN ANTI-AIRCRAFT FIRING.

By Lieutenant W. W. Allison, R.A.

THE question of eye shooting has been, and always will be one of the most difficult problems which an Anti-Aircraft gunner has to solve.

Colonel H. W. Hill, C.M.G., D.S.O., R.A., in the February issue of this Journal pointed out the necessity of eye shooting and also gave a simple method of finding the initial deflections; but before one can embark on an eye shoot with any degree of confidence it seems advisable to carry the study of this very interesting problem a stage further, especially with regard to the tendency of deflections.

It has been suggested that if the initial rounds burst fairly close to the target, it will jink to such an extent that further efforts are practically useless. It is however fair to assume that when a hostile aeroplane comes over one's territory the pilot has a certain mission to fulfil; he may have to take photographs, observe for artillery, to bomb, etc., and whilst he is jinking, all these tasks are practically impossible. In addition, it is highly probable that the pilot will only be too anxious to carry out his mission as quickly as possible and get back home. Hence he may fly on a constant or straight course for a certain length of time, and it is also conceivable that it may be necessary to carry on eye shooting for the whole of this period.

It is thought that the emphasis laid by some writers on the importance of the initial burst is often very misleading. Although the initial burst of fire, in some cases, may give one the best chance of hitting the target, in other cases it may be possible to try again with an equal chance of success.

Hence it is thought that a knowledge of the tendencies of deflections is essential for every A.A. officer and will easily repay the time spent in the study of them, even though the practical

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application of this knowledge depends on the supposition that the target will remain on a straight course for a sufficient length of time to enable him to fire two or three consecutive bursts.

The deflections for the initial burst of fire can be obtained by estimation, as suggested by Colonel Hill. This, it is hoped, will be successful in getting the bursts on or somewhere near the line of sight, even though it may not succeed in damaging or bringing down the target. The question then arises, provided the target continues on its original course, what are the deflections for the next burst of fire?

Firstly.

It would appear unnecessarily laborious to re-assess the target for each burst of fire by the same mental processes as those originally employed. A very rough knowledge of the tendencies of the deflections for the course of the target to be engaged could obviate this. If the initial series of rounds burst somewhere near the line of sight only a small cumulative correction to compensate for the changing conditions, i.e. angle of sight, fuze range and course angle, is necessary in order to keep them there.

Secondly.

When actually firing at a hostile aeroplane, it may often be inadvisable to wait for the initial rounds to be observed, before giving out the deflections for the next and subsequent series. This is specially so at long fuzes when the delay would necessitate losing a considerable amount of time, a factor which is most important in all A.A. shooting. Consequently, the second series, if fired before the first rounds are observed, and if assessed as for the initial burst, stands just as much chance of being effective as the first with the disadvantage referred to above, i.e. slowness in the calculations. Hence the quicker method of applying a small correction to the initial deflections can thus be employed with no less hope of success.

Thirdly.

When observation of fire is being utilised for correcting deflections and it is seen that all the rounds of one series of bursts are, say, one degree behind the target, the addition of this amount to the initial deflection will not necessarily bring the next series of bursts.

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into the line of sight unless some further amount is added or subtracted to compensate for the changing conditions. For example, take a target directly approaching at 100 miles per hour, height 1000 ft., using the 3″ 20 cwt. A.A. gun at an angle of sight of 30 degrees the necessary deflection is up 4 degrees, and at an angle of sight 45 degrees it is up 5 degrees.

Hence a knowledge of the magnitude and tendencies of this correction must be obtained. It is thought that the following diagram, which is based on one originally drawn by Lieut. P. G. Silley, R.N.V.R., A.A.C., in 1918, presents the required information in the simplest and clearest form.

The diagram represents a horizontal projection of various courses, from an overhead course to one the crossing point of which is 5000 yards to a flank. Actually four courses only are drawn in.

Course (1) Target directly approaching and receding, i.e. overhead.
Course (2) Target passing 1000 yards to a flank.
Course (3) Target passing 3000 yards to a flank.
Course (4) Target passing 5000 yards to a flank.

Any intermediate course can be interpolated as long as it remains parallel to the base line, i.e. Course (1).

The vertical and lateral deflections for various points along each course are then worked out or taken from some suitable chart. Curves of V.D. and L.D. are then drawn by joining up all points of equal value.

Angles of sight, fuzes and course angles can be shown in a similar manner; but for the purpose of clearness these have been omitted in the present diagram, only three semi-circles of angle of sight being shown.

The diagram has been worked out for the 3″ 20-cwt A.A. gun, firing a 16 lb. shell with a muzzle velocity of 2000 f.s. at a height of 10,000 ft. and speed 100 miles per hour.

Application.

The diagram must not be confused with any tables or instruments designed for use when in action. An A.A. officer when taking an eye shoot has neither the time nor inclination for any such gadgets. He relies on his instinct as far as possible and it is

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this instinct which must be trained. Rough rules, if sufficiently well known so as to be second nature, are often useful; but a sound knowledge of what to expect and predict in the changes of deflections is what is really required.

The diagram is merely a summary of the correct deflections for various courses drawn out in a simplified form so that the various changes can be readily compared, easily understood and, it is hoped, easily remembered. It is only applicable to one height and to one speed as regards the absolute values. This may appear to be a disadvantage; but actually it is not a great drawback, since any alterations, within reasonable limits, in height and speed from those from which the diagram is drawn should be taken up in the initial estimation so that the net increases and decreases remain approximately correct. For any extremes in height or speed it would be advisable to draw out separate diagrams.

Firstly considering Vertical Deflection.

In Course 1 (overhead target), the vertical deflection increases steadily up to 90 degrees and then decreases. It should be noted that the down deflection compared to a corresponding up deflection is greater.

In Course 2 the vertical deflection increases up to about 60 degrees angle of sight then decreases rapidly to zero at the crossing point. This increase and decrease is also seen in the down deflections.

In Courses 3 and 4 the vertical deflection decreases and increases to and from the crossing point.

Secondly— Lateral Deflection.

In Course 2 the lateral deflection increases steadily to short fuzes when the increase is rapid up to the maximum, i.e. crossing point.

In Courses 3 and 4 the lateral deflection increases and decreases very slowly. The varying rate of this can easily be realised by studying the diagram.

Hence targets other than those directly approaching or receding can be divided, for the purpose of eye shooting, roughly into two classes.

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Class A. Targets which reach a maximum angle of sight of 60 degrees and over.

Class B. Targets which reach a maximum angle of sight of 60 degrees and under, and the numerical values of the increases and decreases may be summarised for the purpose of a rough rule as follows :—

Class A. Vertical. Half degree increase for each burst of fire up to 65 degrees then rapid decreases to zero. This applies reversely to down deflections.

Lateral. Half degree increase for each burst up to a high angle of sight when increase is very rapid.

Class B. Vertical. Half degree decrease for each burst of fire up to crossing point then vice versa.

Lateral. Gradual increase and decrease, variations comparatively small except at short fuzes.

It may appear difficult to guess as to which class a target belongs when it first comes into range. It will be found, however, that with very little practice this is comparatively easy and that one gets into the way of continuing the course of the target in an imaginary line up to the crossing point and thus deciding whether it is Class A. or Class B.

Conclusion.

The last war showed that the art of eye shooting came more easily to some than to others; but with practice a certain number attained a considerable degree of efficiency. It is only necessary to glance at the statistics of the number of planes destroyed by A.A. fire to confirm this. On the other hand to a large number of section officers eye shooting remained a mystery up to the very end, and if any of these were successful in bringing down a plane it was due more to good luck than to good management.

Although it is generally admitted that even now a certain proficiency in eye shooting is necessary for all A.A. officers, there are, at present, but few facilities for teaching it. Miniature ranges are invaluable; but so far there is but one in existence. The A.A. Manual gives but little help :—there are four charts showing deflections for various courses; but these, in the present writer's experience, convey little or nothing to the uninitiated as the salient

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points are not sufficiently emphasized. They tend more to confuse than to instruct.

It is suggested that the necessary knowledge is much easier to acquire if it is drawn out as in the above diagram. All the courses are shown on one sheet. Hence the comparison between the various tendencies is brought into far greater prominence. The value of these suggested rules, rough though they may be, lies in the fact that they help to classify a target quickly and so become an invaluable adjunct to natural instinct.

If the subject is approached on these lines and the fact that eye shooting can be studied as a science and not as an art, is demonstrated, it is thought that any A.A. officer should obtain a considerable degree of efficiency in it, even though the gift be not in him, and when the opportunity presents itself he will be able to carry out an eye shoot with every confidence and a justifiable hope of success.

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POST WAR TRAINING OF FIELD ARTILLERY.

By Major W. T. O. Crewdson, R.A.

THERE are two main branches in the training of an artilleryman, tactics and gunnery, and in deciding the gunnery method to be used in any particular case the governing factor is the tactical situation.

The technical advance of modern gunnery has tended to throw these two branches of artillery work into opposition as claimants for attention at the annual gun practice. Gunnery enthusiasts insist that insufficient time is given to technicalities, whilst those in the opposite camp incontestably point out that mistakes in gunnery can be corrected whilst mistakes in tactics are apt to be followed by disaster. Hence there emerges a school of thought that would separate the two entirely, tactics being taught on drill orders and gunnery being taught at practice camp as on an infantry rifle range—but, and this is a very big but, "In deciding the gunnery method to be used in any particular case the governing factor is the tactical situation." It is however open to question whether under the present system we get the best value out of either drill orders or the highly trained technical brains of the I.G's who come to practice camp with us. It should always be borne in mind that no lecture or conference should exceed an hour. The object of this article is to suggest a compromise whereby these two branches, without being divorced one from the other, may each receive its due share of attention.

At the present moment the annual practice of a battery consists of three or four schemes representing a phase of moving warfare. To allow for the study of tactics and manœuvre there are several changes of position; to allow for a study of gunnery and its application to a tactical situation, quick and more deliberate methods are mixed up. It is suggested that the tactical and

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technical lessons brought out by such a day's practice are beyond the scope of a single conference, and that the mixing of the two prevents the best value of either being obtained by the hearers. Tactical lessons, moreover, best lend themselves to discussion on the ground, whereas technicalities are more suitable for the class room.

The compromise suggested is that there should be two forms of scheme. The first should emphasise tactics and the second gunnery. The first would be similar to the ordinary drill order scheme. There would be frequent changes of position and the conference would be held on the ground at once, if necessary after the conclusion of each situation, thus enabling faults noticed at one position to be corrected at subsequent positions. The importance of initial orders and initial laying out of the line must, however, not be overlooked, or tactical considerations will outweigh gunnery and the B.C. and G.P.O. will find themselves in a situation analogous to playing bridge for "Love." These operations are important and cannot be practised too often. It is therefore suggested that a few rounds, say, three or four, be fired at each target. Nothing is so conclusive as the fall of a shell, and the checking of another's work by compass or any other method, is apt to become a matter of opinion, controversial and unsatisfactory. These days would also lend themselves to the engaging of targets such as advancing infantry or tanks with a normal expenditure of ammunition on each. Range parties would be unnecessary and so safety precautions could be reduced to a minimum.

The second form of scheme would be of simpler nature tactically, or, perhaps better still, a "Carry on" from a former tactical day. Movement would be limited, horses could be watered, fed and even groomed, if conditions were favourable, and thus much of the wearisome waiting undergone by wagon lines eliminated. There is nothing unreal in this, it would be done in war if the tactical situation permitted.

As regards the conduct of the series it is suggested that more is learnt by doing a thing right, than by doing it wrong and then being criticised. Even constructive criticism is apt to make people afraid of using methods that under different circumstances might be correct. It is therefore suggested that, before firing, the officer

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conducting the series should be asked to outline his procedure. If he is wrong the correct method should be explained to him and the lesson impressed on his mind by doing it right himself immediately afterwards. The principle of lecture first and then do it applies equally to conducting a series and to other forms of training.

The conferences subsequent on such schemes would then resolve themselves automatically into mainly tactical discussions, or mainly gunnery discussions. Tactical points would, of course, appear on gunnery days and vice versa, but would not confuse the main issue. Conferences attended by all under these circumstances would not necessarily be daily, but could be held periodically to emphasise general points of interest and general criticisms applicable to all batteries practising.

It is considered that under the above system better value could be obtained from the two great opportunities which practice camp offers. These are: opportunities for manœuvre and picking the brains of the Gunnery Staff, both of which occur all too infrequently.

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THE DIAL SIGHT.

By Captain A. N. Venning, M.C., R.A.

THE following suggestion is put forward with a view to eliminating mental arithmetic on the part of Nos. 1 and simplifying checking of lines by section commanders. A second scale should be provided similar and parallel to the present degree scale and operated by separate thumbscrews and quick release lever.

The two scales should be as close together as possible and should read against a common fixed pointer between them.

The construction should be such that when the upper thumbscrews are used the upper dial plate only is moved; but when the lower thumbscrews are used the lower scale is moved and carries the upper scale with it.

The graduations on the lower scale may read from zero to 180° each way or may be limited to the greatest switch from zero that is likely to be encountered.

The original aiming point angle and any concentration or distribution for parallelism are put on the upper scale.

When shooting commences all deflections are put on the lower scale.

The following advantages are claimed:—

1. The angle from zero is placed on the lower scale and can be read at any moment.
2. The angle from the aiming point on which the sight is laid can be read at any moment on the upper scale, to within a degree.
3. The angle from the aiming point to the zero line can be read at any moment. It appears on the upper scale vertically above the zero of the lower scale; and the minutes appear on the upper micrometer head.

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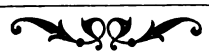
4. Laying from a distant aiming point (which is admittedly more accurate than the use of aiming posts) can be done without the difficult mental arithmetic at present encountered by Nos. 1.
5. The dial sight can be turned at any time on to a fresh aiming point by means of the upper screw, and the angle from zero will still appear on the lower scale.
6. So long as the original aiming point is used by the layer, the necessity for recording on the slate or trail the angle from the aiming point to the zero line disappears. This angle is recorded on the sight and can be checked by the section commander without interruption of the detachment.
7. The layer has no difficulty in choice of which thumbscrew to use. The rule is simple. "Upper screw for initial angle from aiming point and for concentration or distribution for parallelism." "Lower screw for all subsequent deflections."
8. Checking by section commanders is rendered at all times an easy matter.



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NOTE ON ARTICLES ON THE SLIDE RULE.

By Major A. H. Kirk, R.A. (T.A.).

THE two interesting articles on the Slide Rule by Lieut.-Colonel E. C. Anstey, D.S.O., and Major J. A. Dane, D.S.O., prompt me to suggest a still shorter method of calculating the angle of sight with the 10″ rule.

Taking the formula $\frac{1146\,h}{R} = m$

Where m = Angle of sight in minutes,
h = Difference in height in feet,
and R = Range in yards.

This formula is equivalent to $\frac{h}{R} = \frac{m}{1146}$

So that if the range figures on the upper scale of the slide are placed under the height figures on the upper scale of the rule, then the angle in minutes can be read off the upper scale of the rule immediately over 1146 on the upper scale off the slide.

When working in metres 3758 is substituted for 1146.

By this method one setting of the slide suffices, and it is unnecessary to use the cursor at all.

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ANTI-TANK DEFENCE.

By Lieutenant W. A. Murley, m.c., R.A.

MOST officers who have studied the question of anti-tank defence are agreed that the present anti-tank gun (the 3·7″ howitzer) leaves much to be desired. In the first place it lacks the essential characteristic of an anti-tank weapon, i.e., all-round traverse. It is conceded that it is the most suitable gun we at present possess, as it is fairly mobile and a traverse of 40° can be obtained on the top carriage. This, however, is not sufficient, as unless an anti-tank gun possesses all-round traverse two guns have to be used when one would suffice. So much valuable time may be lost in moving the trail and getting on to the target when the top traverse has been exhausted that it would be necessary to have another gun following the tank without firing, this second gun to be ready to open fire as soon as the tank had passed out of the top traverse of the first gun. This is borne out by the last paragraph of Section 62, page 210, Artillery Training, Vol. II, which reads, "When engaging tanks, with guns giving only a limited degree of traverse, a section should be employed against each tank." The writer submits that traverse must be unlimited, and any method which necessitates the changing of a target from one gun to another is bound to be unsatisfactory, as there will nearly always be delay in getting the second gun to open fire at the proper moment, and unless both guns shoot exactly alike, which would be doubtful, erratic shooting will result, in fact it would probably necessitate ranging again with the second gun. The only way to remedy this state of affairs is to have a gun capable of rapid all-round traverse.

Other objections to the 3·7″howitzer as an anti-tank weapon are :—

(a) Not sufficient muzzle velocity.

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(b) Not sufficiently mobile, as when once in position it cannot be moved quickly for any distance, especially over rough or unbroken ground.

(c) It necessitates the dumping of large quantities of ammunition beside the gun, and this ammunition, if not fired, is difficult to collect. It may happen that not a single round would be fired from the gun.

What then, is a suitable anti-tank gun? The writer thinks that a six-pounder gun mounted on a central pivot would overcome all the difficulties mentioned above for the following reasons :—

(a) It should be possible to fix a central pivot mounting to a tank chassis, thus admitting of all-round traverse. The recoil of a six-pounder is short and the base plate to which the pedestal is bolted would therefore have to be fairly thick in order to withstand the shock of the firing of the gun. As the gun will be mounted on a central pivot it will be possible to traverse it rapidly in any required direction by the layer pushing it round by means of a shoulder piece (as at present used on the 12-pr. coast defence gun). The target could therefore be engaged in a fraction of the time taken with the 3·7″ howitzer, and when once on the target the layer could follow it anywhere by simply swinging the gun round. Also, the layer will have only the elevating wheel and firing handle to worry about, which will result in more rapid and accurate shooting. It may be necessary to fit a traversing handwheel, but if so a quick release clamp should also be provided.

(b) The fact of the six-pounder being a gun and not a howitzer will enable greater muzzle velocity to be obtained. It is realised that an anti-tank gun should also be able to render close support to the infantry, as it is impracticable to have a gun that can perform only one rôle, and it must be admitted that the six-pounder is not so well suited for this work as the 3·7″ howitzer. It should however be possible for the six-pounder to render close support to the infantry to a limited extent.

The extra muzzle velocity of the six-pounder would compensate for the difference in weight of shell. The type of shell suggested for use with the six-pounder is an armour-piercing with delay action fuze. A six-pounder is quite heavy enough to stop a tank.

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(c) The fact of the gun being mounted on a tank chassis would increase its mobility. It is not suggested that the anti-tank gun should go out to meet the tank, but the fact of the gun being able to move quickly would permit of a certain amount of manœuvre, and the gun could therefore take up any previously selected position at a moment's notice. Under present conditions it would seem that the gun must take up a position and hope that a tank will appear, and if one should appear it may not be possible for the gun to engage it.

(d) With the gun mounted on a tank chassis there should be no difficulty in arranging for the carrying of at least one hundred rounds of ammunition, so the difficulty of dumping ammunition will disappear. The ammunition could be placed in a kind of box on wheels running on a circular track, thus ensuring that it will always be close to the breech.

The next point to consider is the protection of the detachment against rifle bullets and shell splinters. It should be a simple matter to provide a circular shield about $\frac{1}{4}''$ or $\frac{1}{2}''$ thick. The shield would be bolted to the carriage, so that when the gun is moved the shield moves with it. As the pivot on the gun will move on ball bearings the weight of the shield will not lessen the rate of traverse to any great degree. It will also be necessary to fit an overhead shield as protection against shrapnel. The fact of the shield moving with the gun will permit of all-round traverse and will also afford protection of the detachment against fire from *any* direction. It would be necessary to fit two sliding doors in the shield for entrance and exit.

The detachment must necessarily be small, and the following is suggested :—

No. 1. Layer. (To be N.C.O. i/c Det.)
2. Breech No.
3. Loading No.
4. Ammunition No.

By having the gun mounted on a tank-chassis it would be possible to emit a smoke cloud from the exhaust, thus giving the gun a better chance of getting clear if surprised by the enemy.

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The engine could be driven from inside the shield, so the driver would not be exposed to fire. Two Lewis guns could also be carried for use through movable (sliding) slots in case of emergency. The slots would, of course, be kept closed when not required.

The writer submits with all deference that the above suggestions would be worth a trial. The chief points to be borne in mind are :—

(a) The gun can be traversed rapidly through a complete circle.

(b) The detachment will be protected against fire from all directions.

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ESSAY ON ANTI-TANK DEFENCE. *

By Capitaine Perré.

(Translated by Brig.-Genl. W. Evans, C.M.G., D.S.O.)

PART I.

GENERAL von Seekt in issuing to units of the Reichswehr in February, 1921, certain modifications in their handbooks on combined training wrote: "As the French have a much wider experience than we have in the use of tanks it is perhaps logical to base our training on their methods."

As far as anti-tank defence is concerned cannot we reverse the process and make use of the experiences the Germans underwent.

During the war our methods were hardly tested at all by anything that occurred. On the French front the Germans tried on five occasions to attack with tanks. In no single instance did these tanks, generally stopped by the ground, succeed in penetrating deeply into our line. Each of these attacks was made with a small number of machines, ranging between 27 and 10 at most. The sum total of tanks used in all five of these German attacks was about 80. On the other hand our enemy had to fight (in the French sectors alone) against 18 attacks supported by tanks. These attacks on a large scale represent the engagement of about 3,500 tanks. Therefore 3,500 to 80 may be reckoned as our relative measure of experience. During the war the Germans never produced any coherent or complete documentation on this subject, but only fragmentary notes based on their experiences. Anything they have written since the war merely co-ordinates these. Perhaps the Germans had neither the knowledge nor the experience to make

* "Essai sur la défense contre les chars" (I)—*Revue Militaire Française*, April, 1924.

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them realise the possibilities of offensive action by tanks. We do possess both the knowledge and the experience and I propose here to co-ordinate the German experiences, taking into consideration the technical characteristics of the tank, and its methods of attack. I shall only study the problem of defence against tanks of a similar nature to the Renault tanks (against which the Germans had to fight). It will be easy, starting on this basis, to work out modifications to suit the defence against tanks of superior power. . . . It must be understood that combat between the tank and the anti-tank weapon is not a duel. It takes place in the midst of the ordinary conditions of a battle in which all the arms are playing their part. The first case I shall study is that of the defence of a main line of resistance, and I shall go into it very fully as it is the best known and is richest in lessons and will act as a guide to us in the study of other cases.

The Tank.

I. The Enemy.

The provisional handbook on infantry manœuvre of February 1, 1920, gives an excellent abstract of the characteristics of the Renault tank: the light tank most generally in use is armed with a machine gun or a 37$^{m/m}$ gun. Its speed ranges between 1 and 5 kilos. per hour. It can climb a slope of 1 in 1, flatten out wire entanglements and the usual accessories to the defence, throw down walls of less than 0 m. 40 in thickness, cross a ditch 1 m. 80 wide, or pass through water 0 m. 70 in depth. In soft ground or in bad weather, these are much reduced. Ground turned into craters by the prolonged fire of heavy artillery, intricate systems of trenches which are deep and very wide cannot be crossed by the light tank.

It carries enough motor spirit to enable it to move for about 8 hours. It is invulnerable by ordinary bullets and splinters of shell. It can be heard moving at a distance of 300 to 600 metres.

It is difficult to conceal from view once it has been started from cover. The crew have difficulty in observing or laying.

I add its dimensions:—

Width	1 m. 740
Length without its movable tail	4 m. 100.
Height	2 m. 140

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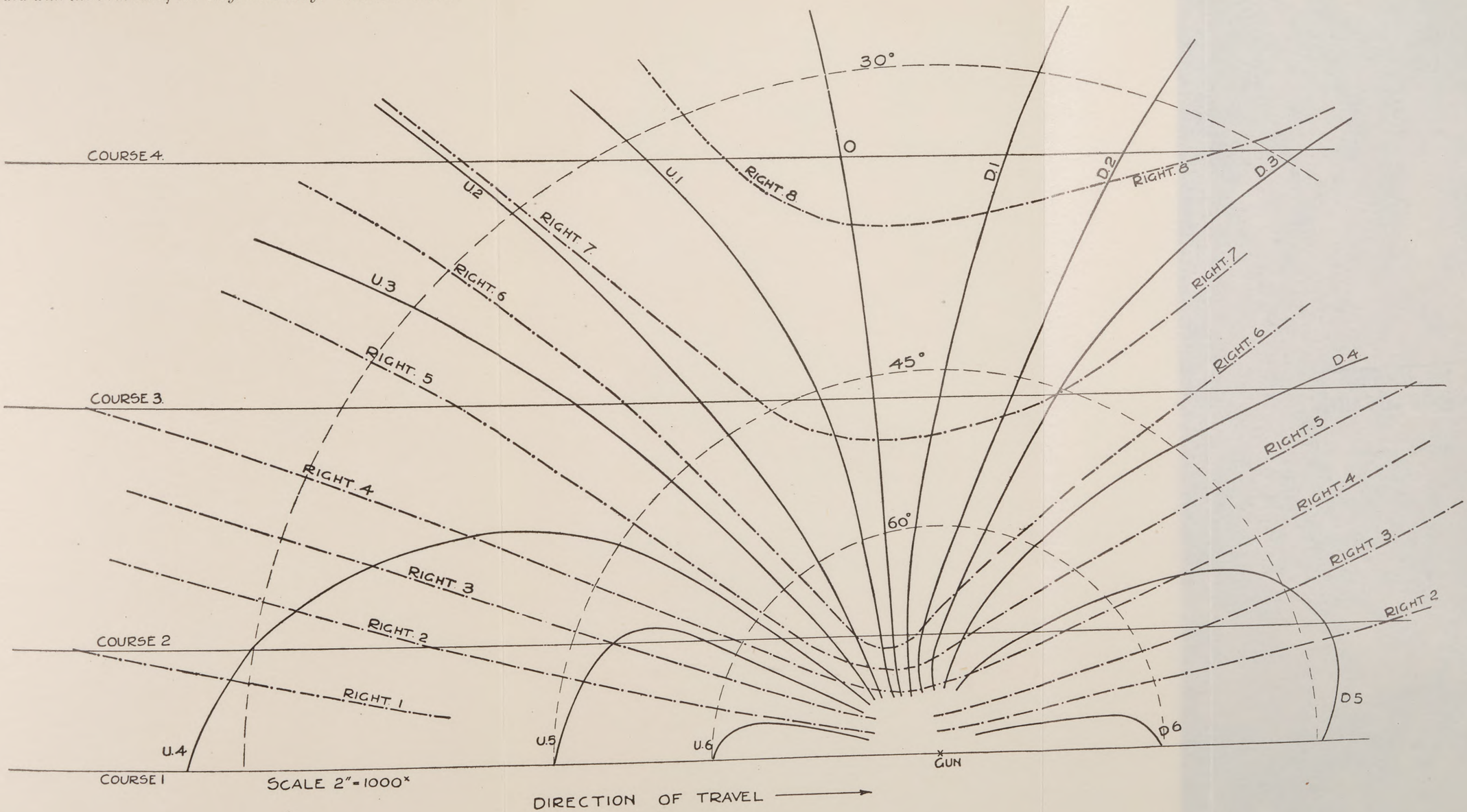
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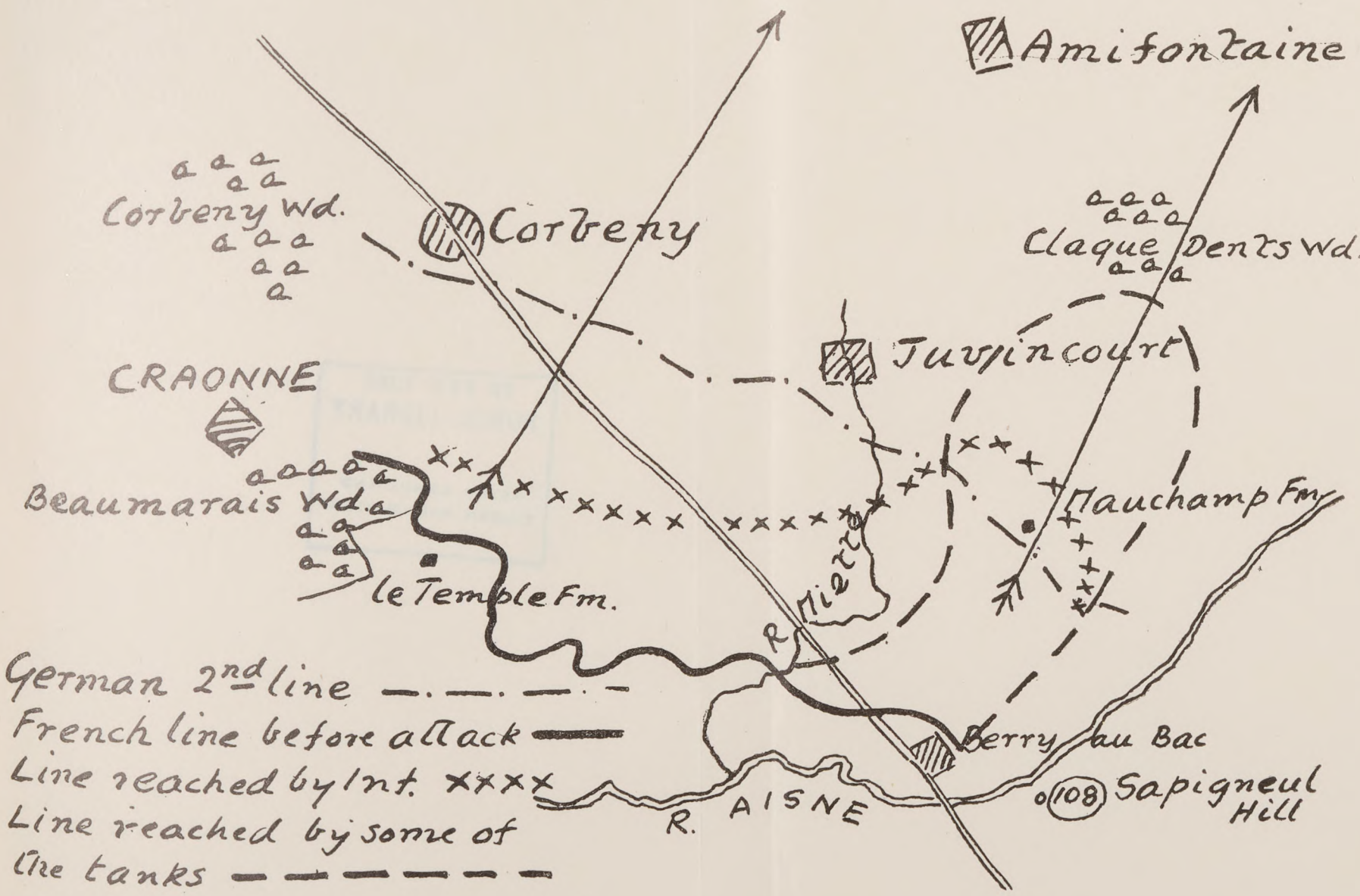
Amifontaine
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CRAONNE
Juvincourt
Beaumarais Wd.
Hauchamp Fm.
le Temple Fm.
German 2nd line
French line before attack
Line reached by Int.
Line reached by some of the tanks
Berry au Bac
108
Sapigneul Hill
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II. Weapons of Defence and their use.

Against such a machine two methods of defence at once suggest themselves, (1) passive defence by confronting it with obstacles, (2) active defence by causing its destruction or killing its crew. Later a combination of the two was tried by the construction of mine fields.

Passive Defence.

(1) It is possible to find for a given type of tank impassable natural obstacles. These are for the Renault :—

(a) Steeper slopes than 120%.
(b) Rocky escarpments.
(c) Watercourses or lakes wider than two metres and more than 0 m. 70 deep.
(d) Marshy ground into which a man's foot sinks—the distributed pressure of the track being practically equivalent to that of a man's foot.
(e) Certain classes of wood, especially woods subjected to heavy artillery fire or where trees of medium thickness have been systematically felled.

Other obstacles would only cause a loss of speed; but this loss of speed could be taken advantage of by weapons of defence. Tanks can work in forests but cannot fight under favourable conditions.

French and German regulations agree as to the use of natural obstacles in determining a line of resistance.

The general tracing of a line of resistance . . . . uses as much as possible important natural obstacles to stop hostile attacks and more especially the advance of tanks. (Provisional instruction for the tactical employment of higher units of October 6, 1921.) . . . . the ground in front of the position of resistance should be as far as possible protected against tank attack (water courses, marshes, cliffs). (Combined Training, September 1, 1921.)

2. Artificial Obstacles.

The Germans made use of :—

(a) Floods, which if they fulfil the conditions given above for natural water courses form an impassable obstacle, but obviously can be rarely made use of.

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(b) ditches more than 2 feet wide have certain drawbacks that reduce their value. They are difficult to maintain and the sides fall in, thus becoming mere depressions. To prevent this they must be revetted, or built up, which means labour. They are easily located by air photographs and concentration of field artillery can easily make practicable crossings.

(c) Improvised barricades—(of vehicles or farm implements) or solidly constructed (tree trunks, or iron spikes in concrete, or concrete walls, or concrete posts with thick iron rails, &c.), are always located by air photographs—artillery can open breaches—sappers accompanying the first waves of attack could open passages by the use of explosives.

(d) Tank traps (ditches 6 feet deep by 18 wide covered with branches of trees with a light covering of earth)—take a long time to construct, are hard to maintain, and do not constitute a satisfactory obstacle.

To sum up: artificial obstacles always necessitate a great deal of work in time, men and material; they are difficult to conceal, with the exception of floods they are none of them impassable obstacles, they only hamper and retard the speed of tanks, and must be covered by the fire of anti-tank weapons (just as wire entanglements must be covered by anti-infantry fire.)

Even so one must not entirely neglect to make use of them. A position provided with a system of artificial obstacles can only be attacked after numerous air reconnaissances and artillery preparation. *Artificial obstacles therefore form a guarantee against a surprise tank attack.* This is an advantage of which the importance must not be under-estimated as the assailant counts surprise as one of the most important factors of success in a tank attack.

Active Defence.

The anti-tank weapons that have been employed up to the present are:—

(1) The gun or trench mortar.
(2) Rifles and machine guns of normal or of special pattern.
(3) Grenades.
(4) Flame projectors.

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(1) *The gun as an anti-tank weapon.* Guns may employ indirect fire, or engage tanks over open sights.

(a) *Indirect fire.* The effect of indirect fire was over-estimated by the Germans in 1917; we, too, often appear inclined to over-estimate it. Common sense tells us that the effect of indirect fire must be very small, as:—

(1) The tank is a very small target;
(2) It moves;
(3) It is only knocked out by a direct hit.

One can only hope for good results from observed fire, and unless the fire of a large number of batteries is concentrated on a narrow lane, no really good effect can be obtained. The first experiences in the war appeared to justify the opposite opinion. I shall now point out the fallacy of this view.

The English engaged their tanks commencing in September, 1916, in partial attacks, in very small numbers, on narrow fronts. The German artillery obtained quite good results using indirect fire. The French High Command therefore came to the conclusion that their tanks should be engaged on a wide front. They were employed for the first time in the battle of April 16, 1917.

The VI Army faced the Chemin des Dames, the V Army attacked in a north-easterly direction in the wide gap between the spur of Craonne, and the Aisne above Berry-au-Bac. 8 groups (132 Schneider tanks) were allotted to the V Army. They were to be used on the two flanks of the attack. On the right 82 tanks were engaged on a front of 3 kilos., roughly between the Aisne and the Miette. On the left 50 tanks were engaged on a front of 2 kilos., starting south-east of Beaumarais Wood and moving in a north-easterly direction. The tanks were only to pass through the infantry to take the enemy's second position on the front Mauchamp farm—Juvincourt—Corbény. The attack was not wholly successful. The tanks suffered severe losses from the enemy's fire, and the greater part of these were due to indirect fire from artillery. It was easy to jump to the conclusion that long range artillery was capable of stopping a tank attack. The Germans readily accepted it as an axiom. The report of the divisional artillery commander who engaged our left attack stated that it was unnecessary to detail

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anti-tank batteries, and that it was quite sufficient to concentrate on them fire from certain batteries relieved for the time being from their normal programme. A few months later in August, 1917, one read in the intelligence summary of the Crown Prince's group of armies that: "Tanks are powerless against our means of defence, specially the artillery."

A more careful study of the facts would have considerably modified these conclusions. There is an excellent account of the attack of 16 April, 1917, in a book by Captain Dutil, "Les Chars d'assaut," from which the following passages are quoted. Let us first see what happened to the left attack:—

"At 6 hrs. 20 the march was continued *in one single column* the 3rd group leading, towards le Temple farm, and La Plaine trench, where we were to pass through the lines. As soon as it left the wood the column was observed by enemy aircraft and at once subjected to severe artillery fire. In spite of this the column reached the last French trench without loss, but the preparation of the crossings was not complete, and *a halt had to be made.* Two tanks were hit by shell and put out of action. Nevertheless the head of the group arrived at 7 h. 15 in front of the German front line trench, from 4 to 5 yards wide, but the preparation for crossing had only just commenced and the tanks had to halt. . . . As they were then in full view of the observation posts that the enemy was still manning on the Craonne plateau, they were subjected to accurate artillery fire and soon knocked out. . . . The group behind tried in vain to deploy its tanks to the left; these were also caught by shell fire and set on fire or stopped, and only four of them were able to withdraw. As for the last group which only comprised 8 tanks, it came under fire at le Temple farm, and was stopped 500 yards from the German front line after having made a vain attempt to deploy. . . . Twenty-three tanks were destroyed in our lines by the enemy's guns."

The good results obtained by the enemy's guns can well be said to be due to excellent O.P's, the fact that the tanks moved in deep columns, and that they had to halt. The same conclusions can be arrived at from what happened in the right attack. The three groups of tanks on the left (2, 6 and 5) worked in ground where the enemy had not good observation; they succeeded in

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deploying, and once this had been done, they had no more casualties except from guns laying direct. No. 6 group "engaged by guns firing direct from Juvincourt, and Clacque-Dents wood suffered severely; between 11 h. 30 and 12 h. 30 five tanks took fire one after the other. One isolated 77 gun at close range, served by three men, succeeded in putting two tanks out of action before being itself knocked out by a gun from a tank." Groups 5 and 9 working in ground in view of the O.P's south of the Aisne (point 108, Sapigneul Hill) suffered casualties from indirect artillery fire. "The ground churned up by shell fire obliged it (No. 9 group) to cross the Wurtzbourg trench in column with its remaining 11 tanks. It was ranged on at once and the artillery fire on it became more and more accurate; the tail of the column was hit first, then the head, and all the tanks except one were rendered immovable, or set on fire. . . . As for No. 4 group, the last of the column, it had only left the rendez-vous about 7 h. 20 and had moved slowly towards its zone of action near the Aisne. . . . The tanks succeeded in driving the enemy back, but at once came under fire from the guns on the left bank of the Aisne and two took fire. Three were able to move forward, but of these two were set on fire. . . "

Here the tanks were used in small bunches one after the other, on which the enemy artillery concentrated their fire.

The example of April 16 cannot be considered to prove that indirect artillery fire can stop tanks. On that day the artillery had worked under favourable conditions never likely to occur again; tanks in deep columns, and halting, or moving in small bunches one after the other in full view of excellent O.P's. We may add that Schneider cars were heavier, less handy and more bulky than the Renaults; that a great number were set on fire even without being hit merely by the bursting of a shell close to them. This last fact completely alters the conditions under which a Renault must be engaged, as nothing but a direct hit affects it. The Germans should have grasped the fact that the conclusions they had arrived at were erroneous.

On May 5th, 1917, 31 tanks (Schneider and Saint-Chamond) took part in the attack on Mennejean farm and Laffaux Mill; only one was hit by artillery.

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On October 24, 52 tanks (Schneider and Saint-Chamond) took part in the attack on La Malmaison. The Germans acting on the so-called lessons learnt from April 16 had the greatest confidence in action by long-range artillery; they had almost given up keeping single guns in front as anti-tank guns; they organised their O.P's with great care and had arranged a triple "anti-tank" barrage; every battery immediately had to abandon its normal programme to engage tanks directly they came into its zone of observation. The German High Command concludes with satisfaction: "On account of their slow speed and lumbering movement tanks form an excellent target; they are very vulnerable in spite of their armour. Experience shows that with a well organised defence there is nothing to fear from tanks." In spite of this confidence their defeat was complete. The German artillery opened a heavy fire one might almost say a violent fire but did not succeed in stopping the tanks; only six were hit by shell fire. To obtain this meagre result the Germans completely disorganised their programmes of defensive fire, and the result was unfortunate for them. As the whole of the artillery fire was directed on the tanks, our infantry was hardly shelled at all. In several places the enemy artillery firing on the advancing tanks was hitting their own infantry in the sectors into which the tanks had penetrated. It is a curious fact that the French infantry reports state that at certain times, in certain localities they were strongly supported by tanks, while the tank units concerned report no fire action at those times and places. This paradox is explained partly by the moral effect of tanks, but also by the fact that they drew the enemy artillery fire from our infantry on to their own. It is only fair to add from the French point of view, that every endeavour had been made to silence the artillery by counter battery work, masking observation posts, etc.

In all the later attacks it is extremely difficult to differentiate between tanks hit by indirect or direct fire. It does not seem likely that if these details could be arrived at they would contradict the preceding statements. In any case they are of less interest as the Germans after October 24 and the British attack on Cambrai a month later gave up the idea of protecting their line from tanks by indirect fire. For the future they depended on weapons firing over open sights, and preferred using their long range artillery during the

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approach march, and in the course of the attack on tank units in support. They considered heavy howitzers were suitable to this task, which appears sound as only big bursts are capable of damaging the tracks of the tanks; these as a matter of fact were much less fragile than they were considered to be; field artillery bursts had no effect on them.

I sum up the possibilities of indirect artillery fire as follows:—

(1) Long range artillery cannot stop an attack by tanks deployed on a wide front.

(2) It is worth using against:—
Tanks attacking on a narrow front;
Tanks halted;
Tanks in column.

(3) In all cases fire must be observed.

(4) To be effective (as is the case with all moving targets) fire must consist of barrages, not of attempts to follow up the tanks.

(b) *Guns firing direct* (including trench mortars shooting as guns). Direct fire has shown itself much more effective than indirect. This superiority can be easily understood, and as everyone is agreed that this is so there is no need to support it by examples, although there are many to hand; for there are few tank attacks where one does not find that some individual gun firing direct did good work.

During the war the Germans used:—

(1) The 77's of the infantry batteries, and the divisional artillery.

(2) Light "minenwerfers" mounted for direct laying.

I extract the following information as to their use, and their effect, from a book by Major Rohrbeck, entitled *Taktik*, which was published in 1919. This book is a careful compilation of the various regulations, notes and instructions published by the German High Command during the war.

(1) The 77's used as anti-tank guns were usually the ordinary field gun; occasionally they were to be found mounted on low wheels. This type appears to have been intended to be issued ultimately to all the infantry batteries. These guns were placed

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either as single guns, or in sections, throughout the infantry line. They fired steed capped armour piercing shell.

"The artillery acts up to 1500 yds. Direct hits are alone effective. . . . Positions must be found from whence fire can be opened at wide lateral angles." These guns can be either immobile in strongly fortified emplacements, or mobile, i.e., with several camouflaged alternative positions. "The infantry batteries, and mobile field batteries in close touch with the infantry have proved themselves more effective than guns in fixed positions." Besides these specialised guns: batteries of light artillery, disposed in depth for other tasks, must in the case of deep penetration of the line by tanks, detail guns or sections to move rapidly into positions in the open, or masked, to engage advancing tanks." Finally guns (or even trench mortars) on motor vehicles, or caterpillars, or simply in reserve on wheels were made use of as mobile defences. We shall touch later on the last two methods.

"*Light Minenwerfer mounted for use as guns* are very effective up to 600 yards. They can penetrate the armour. Their object should be to hit the tank in the flank. The error of the gun is lessened by firing from a platform. Difficulties of supply of ammunition necessitate great care. They should be used in groups of 2 or 3 protected by two light machine-guns, and attached to each battalion. This excellent weapon of defence is thus disposed in depth throughout the battle zone."

In spite of what Rohrbach says it may be taken that the effectiveness of this "excellent weapon of defence" is inferior to that of the 77 on account of the error of the gun (which is very great in comparison with the size of a tank) and its short range. These weapons firing over open sights, however effective, cannot be absolutely depended on in anti-tank defence as they are included in the infantry zone of combat, and exposed to all its risks. In fixed positions they run the risk of being destroyed in the preparation; mobile they stand the chance of being neutralised by the direct support artillery fire, and of seeing the tank upon them before they have fired a shot; besides, they labour under all the disadvantages common to all artillery fighting in the infantry line: visibility, necessity for traction by man power, rapid expenditure of ammunition.

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In France we only have two weapons capable of being used for this task :—

The mountain gun of 65$^{m/m}$, of which there are very few.

The 75, unsuitable but which must be used for want of something better.

The method of fire laid down in our "General Instructions for Artillery Fire" of March 20, 1923, is as follows :—

Fire is opened when the tank reaches 1000 yards from the gun. Laying should be on the ground line below the front of the tank. Ranging should be by bounds of 200 or 100 yds. (the latter if preliminary reconnaissance has determined accurately the distances to certain points on the ground.) When a shell bursts close to a tank and in front of its line of advance, four or six rounds are fired at gun fire. This procedure is repeated till the tank is hit.

Of our two infantry accompanying guns :—

The Stokes mortar is very inaccurate and should be done away with.

The 37 is not powerful enough and should only be considered as an auxiliary weapon to be used in zones where tanks can only move with difficulty (woods, villages, etc.), or behind artificial obstacles. In fact with the 37 a direct hit is quite likely to glance off the armour unless it hits at right angles. . . . experience of firing with a 37 against a German tank of the "Elfried" type has proved the total incapacity of this weapon.

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THE SUBALTERN IN INDIA.

By Lieut.-Colonel C. H. Clark, d.s.o., R.A.

THE following notes on soldiering in India are put forward with a view to assisting subalterns who are posted to batteries in India for the first time in their service. The writer fully realises that on a subject like this there must be several opinions, his remarks however are based on a very fair experience of India extending over several years, from 1901 to 1913 and 1919 to 1924, during his service in several stations in the Punjab, Central Provinces, United Provinces and Bombay Presidency.

It must be understood that conditions in different parts of India vary considerably as regards climate, expense, facilities for sport, etc., and one man may prefer the North, another the South and another the Centre, and, though one can endeavour to get posted to a certain brigade stationed in a certain part of India, the easiest and perhaps the best course would appear to be to take what comes, as units are frequently moved and so one sees various parts of India during the tour of one's service out there. As regards the South of India the writer confesses to complete ignorance thereof, never having served south of Kirkee. The main object of choice, if any exists, should be to get posted to a brigade where one has friends and a vacancy exists.

India for military purposes is divided into four Commands, the Northern, Southern, Eastern and Western, which names sufficiently describe themselves, each Command is divided into Districts and Districts are sub-divided into Brigades. The writer is at present serving in the United Provinces which is in the Eastern Command, and, of the two Field Artillery brigades at present serving in the U.P. District, one has three batteries in one station and a fourth battery in a single battery station, and the other has two batteries in one station and two other batteries each in single battery stations. Opinions differ as to the choice of single battery stations or stations

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where two or more batteries are together. The advantages and disadvantages of a single battery station may be summed up roughly as under :—

Advantages:—

The inherent desire to be on one's own is accomplished within limits : it necessarily implies a smaller station and is consequently perhaps less expensive and has greater opportunities for small game shooting owing to the smaller number of guns : it involves, perhaps, less work in the way of dull routine such as courts martial, boards and committees, and less social functions with perhaps a cheaper mess.

Disadvantages:—

Owing to the station being smaller, games such as polo, football, hockey, cricket, etc., cannot prosper so well for want of players : the club and mess are smaller, and therefore cannot be so well run or so flourishing, owing to the reduced income. This particularly applies during the leave season in the hot weather when numbers are very much reduced below normal. There is in consequence not the same facility for meeting other arms and other people. As regards training, manœuvres and co-operation with other arms are less easy in a smaller station and duties such as guards and orderly officer, and employments fall on the individual battery instead of being lessened by a combination of batteries in the brigade. Similarly the battery has to run and man its own institutes instead of brigade headquarters taking on this duty.

Facilities in India for training and manœuvre are far greater than at home. Ground is unlimited, and in most stations every variety of country can be found. Batteries are kept up to strength in officers, men and horses on a six gun basis, and drafts arriving from home are all more or less trained men.

A major has a complete battery under him, and a section commander has his own section complete in every detail. A battery or section can go anywhere at a moment's notice, on its own, with the proviso only that no damage is done to crops and cantonments are avoided, neither of which conditions cause any serious difficulty.

Against this must be set the disadvantages caused by climatic conditions, which include the hot weather and the monsoon both

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of which restrict training and manœuvres on a large scale for a total period of, say, six months in the year, but do not prohibit such exercises on a smaller scale.

The facilities for sport vary all over India—as before mentioned the larger the station the better the class of game played—but the further one has to go for small game and fishing. In the U.P. sport of all kinds is obtainable, but undoubtedly the Central Provinces and Central India, close by, provide better sport for big game, and Kashmir, with its famous shooting and fishing is by no means inaccessible.

Ordinarily small game shooting—duck, partridge, snipe, quail, etc., is obtainable at or near almost all stations, the further one can go the better the bag. In consequence a motor car or motor bike is of great use but these modes of conveyance are by no means essential. A trap, a pony, or a tramp on foot will produce a very good day's sport. The expense is small,—the cost of cartridges and a few coolies, which can be obtained anywhere at about six annas a head a day—provided one possesses a gun.

In all stations in India each unit has its own football and hockey grounds, the sergeants' mess usually has one or more tennis courts, the Officers' Club runs all games for officers including polo, cricket, golf and tennis and often possesses a racquet court.

The cost of all games as regards the upkeep of the grounds is borne by the Club, defrayed out of subscriptions by members to the Gymkhana Club, generally Rs12 per mensem per member, apart from the house subscription which may be taken on an an average as Rs10 per member per mensem. It is not obligatory to join both, or either, but it is a virtual necessity, for without it one loses every advantage of games and social life. Most clubs charge in addition an entrance fee of about Rs50 which is payable generally in three instalments. Honorary members are accepted for short periods without any subscription and temporary members for subscription only, but such of course have no powers in the club as regards management or voting. This privilege however is of great value when on visits to other stations or on leave.

Officers of course have to provide their own gear such as polo sticks, cricket bats, golf clubs and balls, and tennis racquets, but for tennis the net and balls are provided by the Club. In this connec-

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tion it might be mentioned that polo sticks, about Rs30 a dozen, on an average, are best bought in India, as also hockey sticks. Tennis racquets, golf clubs and cricket bats are best brought out from home owing to the higher prices obtaining in India and the inferior quality of the country article. The English article bought in India suffers from the high customs duty now prevailing. Tennis racquets can be bought in India at prices varying from Rs80 to Rs6, the former being a good English racquet, and the latter the cheapest country racquet of no value at all. But country made racquets fit to use can be bought at Rs16 or over. Racquets can be restrung out there quite well with English gut at Rs15, or with country gut at Rs6. The latter is good enough for the ordinary amateur playing for exercise and amusement, and not in serious tournaments.

The buying of horses and ponies is, as always, a difficult subject. However a few words on it may not be out of place. Every officer R.F.A. has to provide himself with two chargers and the cheapest way to do this is to purchase two remounts from the Government remount depot. An officer may go by arrangement to the depot and make his own selection. The price for a Waler (Australian horse) for a subaltern is Rs 600 or approximately £40, which is charged against his pay in 18 monthly instalments. A first class untrained waler pony or horse, aged about seven, may be obtained in this way and becomes the sole property of the officer after he has had it for five years. If he does not for any reason, keep it for five years he has to return it to the Government, and has his money refunded less 10% per annum for the time he has had the horse in his possession. This is of course subject to the animal being returned fit and sound. An animal purchased in this way may be trained into a valuable charger, or polo pony. To buy a charger privately has its risks and its disadvantages as also its advantages. A raw waler may be bought in India for about Rs1000 in the open market from dealers, and may or may not turn out a good buy. A trained pony may be bought at anything from Rs500 to Rs5000, the price depending on its age, pace, training and soundness, etc. Often an old pony sound to play polo and an excellent animal for a beginner to learn on can be bought for Rs500, and will play ordinary station polo, but one cannot expect to buy a fast tournament pony at this

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price. Rs1000 should buy a trained pony fit to play in ordinary station polo with several years' play left in it, and should give good value for the money. The same pony of 15 hands will do for polo and as a charger.

The new arrival however should not buy an animal without the advice of someone who knows, and there is no difficulty in a battery in obtaining the very best of advice. In this connection I might mention that I know of a subaltern who came out to India with less than a year's service and bought a trained pony for about Rs1000 and eight months after he arrived he was playing in a tournament in a fairly big station, and the team did quite well.

As regards the keeping of a pony, the Government allow free forage and Rs15 for every authorised charger, and therefore the feed of the pony and the pay of the syce (or groom) cost the individual nothing. The only expense in this case is saddlery, gear and incidental expenses. Veterinary attendance is usually free. For ponies kept over and above the authorised number of chargers the expense at once mounts up, and Rs50 to Rs60 per mensem may be taken as approximately the cost of feed and syce per animal kept privately.

As regards mess bills in India, the average subaltern's mess bill with care should not exceed Rs170 per mensem. This may be calculated as follows:—

	Per Month. Rs
Messing at Rs3 per diem	90
Wine bill, with smokes	30
Papers, stamps, parcels, etc.	5
Mess subscriptions	20
Miscellaneous	5
Mess guests	10
Special for entertainments	10
	Rs170

Other obligatory expenses may be approximately calculated as follows:—

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	Rs
Club, subscriptions only	22
Share of bungalow rent	25
Furniture	10
Servant (personal servant)	25
Washing	6
Servants (share of servants in bungalow)	15
Battery subs.	5
Light, fuel, baths	8

or a total of Rs116 per mensem.

The third item is ordinary expenses of living and vary with the individual :—

	Rs
Club bill (drinks and smokes)	30
Sports gear	20
Clothes	50
Income Tax	15
Miscellaneous	50

These three totals combined make Rs451 per mensem which does not leave a large margin for saving or buying ponies, etc., out of a total pay of Rs475 per mensem (Lieut., the pay of a second Lieut. is only Rs425 p.m.) However given a fair start with clothes and complete outfit of all gear for games, etc., a subaltern can live comfortably on his pay with care. (After 7 years' service pay rises to Rs550.)

Servants are easily obtained locally, and are reliable. A bachelor requires one good bearer at Rs25 per mensem, who can look after his rooms and clothes and wait at table in mess when required. In the bungalow, servants can be shared, and three to four subalterns live in one bungalow and have each one bedroom, dressing-room and bathroom, with perhaps a spare room for saddlery, boxes, etc. They share the expense of one chowkidar, or night watchman, at Rs12 per mensem, one mali or gardener at Rs10, one bhisti or water-carrier at Rs12 and one sweeper at Rs12, a total of Rs46 per mensem or say Rs12 each.

As regards climate, the year may be roughly divided into three seasons in the U.P.; the hot weather from March 15th to July 1st,

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the monsoon from July 1st to September 15th, and the cold weather from October 15th to March 15th. The remaining month from September 15th to October 15th may be wet and cool, or drier but humid, and anyhow is not pleasant. The cold weather is delightful, the hot weather is unpleasantly warm and probably goes up to 112° in the shade as a maximum and down to about 80° at night, which is not by any means unbearable. High winds prevail generally during March and April and with khus khus tatties (wet fibre mats) placed in the doorway with the door removed, the air inside the bungalow, if all other doors are kept closed may be kept cool and moist. When the wind drops and the temperature is high, the only solution is to keep the bungalow open by night and closed by day, and to use punkahs or fans by day—worked by coolies at Rs6 each per mensem. One coolie is sufficient per officer in a bungalow. Eventually all stations in India will be provided with electric light and fans, but at present only a few stations are so lucky though most clubs run their own plant. For about a month in the cold weather, say from December 15th to January 15th, normally a fire in the evening is a luxury but not a necessity. Except during the rains the sun may be expected to shine bright and warm from sunrise to sunset every day, which has its advantages! Taken all round the climate is good and healthy and at no time is it unbearably hot or unbearably cold. The worst enemy to be found is perhaps the mosquito, and he can only be defeated by attempts at extermination or reduction by methods soon learnt out here, mainly by the prevention of his breeding by ensuring that no still, stagnant water lies handy at his disposal, and by the use of a punkah at night when required or by a mosquito net when no punkah is used, and by a liberal use of quinine. The mosquito thrives during nearly all the year with the exception perhaps of December and January when he is less active, but a mosquito net is advisable all the year round and the expense is slight—say Rs10 for a net which with care and repairs lasts for several years.

As regards kit for India one requires all the kit one has at home, and in addition cool clothing which is easily and cheaply obtainable out here. The Indian dirzi or tailor is a useful, handy man and cheap, and it is a mistake to bring out any special clothing for India. except as a pattern, and for use on board ship or on arrival. White

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mess kit, khaki drill uniform and all cotton clothing can be quickly and well made out here from a good pattern. Riding breeches, boots and shoes, mackintosh, hats and helmets, for both uniform and mufti, should be brought out. Moochis or boot-makers abound in India and appear cheap and clever, but inferior work and inferior material make them more expensive in the end. It must be remembered that all articles except uniform are liable to a high customs duty when *sent* out.

Similarly, rifles, guns, rods, golf clubs, tennis racquets and cricket bats should be brought out. Ammunition can be obtained in India as required though it is cheaper for a mess or club to buy direct from home in large quantities and retail to members.

As regards the journey out it is very necessary to include in one's kit some khaki uniform and a helmet, and a mufti helmet. The khaki, as explained before, serves as a pattern for copying. Kit should also include a valise, blankets, sheets, and camp table, chair, and bed, etc. These are cheaper and better at home and are very useful on the journey and on first arrival.

Do not imagine that India is always a hot country, it can be cold enough at times and in places to justify all the cold weather kit one can want at home.

Be careful on arriving at Bombay or Karachi about being misled into taking on casual servants, or buying unnecessary things. The best servants obtainable are usually the local product of one's own station, taken on with good references from other officers. The man hanging about docks, railway stations or hotels is usually a waster unless he has been sent down to meet one. The man who lives in an entirely different part of India to one's station is always wanting leave to go to his home or imports a large family to his new station at his master's expense and after that wants trips home ! On joining at a new station one should put oneself unreservedly in the hands of brother officers, and ask their advice freely and thankfully. They will see the newcomer is not let in and are all out to help.

The leave season in India is normally the hot weather from March 15th to October 15th. Three days' leave can be given at any time by the C.O., and ten days' leave by the Station Commander, provided one can be spared from duty. Sixty days' privilege is granted normally every year, and, on an average of once in four

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years, six months' leave can usually be obtained. All leave in India, and all privilege leave home, is on full Indian pay. Leave out of India other than privilege leave, is on English pay. There is a very large choice in the way of spending leave in India, limited mainly by distance and expense. Roughly the two alternatives are leave in a hill station or on a shikar trip. The former is not to be recommended as it is merely a repetition of the social life led in the plains but in a cooler climate and without any work and with less facilities for amusement. A trip on any form of shikar is the obvious and most desirable form of leave, and two or three officers can always combine and have a very pleasant holiday. Kashmir is the most famous shooting ground for the north of India, and the Central Provinces and Central India jungles for those further south.

As regards the prospects of married subalterns in India, the answer is that for a bachelor India is a most excellent place to soldier in but the married subaltern is better at home. With sufficient private means a married subaltern can have a very good time anywhere, but in India the constant separation caused by both climate and work, the added expense of keeping up two establishments, the difficulty of educating children and the expense of clothing all tend to make the life of a married subaltern a hard one. In addition the absence of one more officer from the mess in a single battery station makes a deal of difference.

A motor car in India is by no means a necessity, it is a luxury—a motor bike is a convenience, but in both cases, if it is a choice between ponies or motors, the pony gives far better value every time. If one can have both one is fortunate and happy but the pony or ponies must come first. For shikar of course a motor is a great advantage for small game shooting in the station—on a big game shoot it is unnecessary. The car is not only an expense itself but leads to many others.

The bachelor subaltern in India can manage to live on his pay and lead a very comfortable and happy existence provided he obtains a good start and can rely on arriving fully equipped with all he needs for his work and his sport without touching his pay—this should include if possible the cost of two ponies. He can then keep up repairs and replacements out of his pay. The life is extremely pleasant and instructive and without private means the

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bachelor will have a far better time soldiering in India than at home, and with a small allowance of his own he can have an extremely good time and join in everything. He will have seen and learnt more of the world and the Empire, and he will have a thorough good training in his profession. After six years in India he has the chance of claiming to be posted to the home establishment, or if he so prefers, he can ask to remain on in India if the life appeals to him as it does to many.

There is no doubt that the earlier in one's service one comes to India the more one will enjoy it, and also still have the opportuniy of staying out or of coming out again after a spell at home. All newcomers should at once endeavour to pick up as much of the language as they can—it is invaluable on all forms of shikar and travel and in every day life. Also in these days, when the personnel of a field battery contains such a large proportion of Indians, a fair knowledge of the language is an invaluable asset in one's every day work. The task is not difficult and more than repays the trouble taken, and the job is far better tackled at once to obtain the full value of the results.

In these notes there has been no mention of pigsticking—one of the finest sports in the world—the expense is not great, perhaps the same as that of playing polo, but without doubt polo is of greater value to the average subaltern and gives greater value for money in days' sport per year, as one may reckon on polo three days a week in almost any station all the year round except during the rains and as a game polo is second to none. Pigsticking cannot be obtained in nearly so many places, and involves greater risks to the horse. It is almost impossible to indulge in both sports unless one has an abundance of leisure and a long pocket.

Hunting can only be obtained in a few places, notably Peshawar and Ootacamund, but many stations run a pack of sorts with which good fun is obtained. The polo pony can compete with this, but few people care to risk a good polo pony out pigsticking. In conclusion I can only say come out to India as early as you can and you will never regret it.

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SOLDIERING AND SPORT IN NIGERIA FROM AN ARTILLERY POINT OF VIEW.

By Lieut.-Col. A. H. W. Haywood, c.m.g., c.b.e., d.s.o., R.A.

Openings for a Gunner in Nigeria.

IT is thought that a great many gunners, and particularly those of the younger generation, may not be aware that Nigeria offers them any soldiering possibilities. By so many people West Africa in general, and Nigeria in particular, is regarded as "the back of beyond": a land frequently alluded to (quite wrongly I can say from long experience) as "The White Man's Grave." Such false notions as these are apt to give the impression that in such a God-forsaken country no soldiering worthy of the name can surely exist.

I therefore hasten to dispel the illusion. I can assure any keen young officer that in Nigeria to-day he will find that soldiering is a "live show." Officers and men are smart and efficient gunners; close touch is kept up with the School of Artillery at Larkhill, where officers and British non-commissioned officers are sent for courses periodically; and every endeavour is made to keep "au fait" with modern ideas.

There is too a good sporting chance of active service in West Africa, although it is true that the halcyon days have passed for ever when the young gunner who went to Nigeria could practically count on seeing service every year. Nigeria too offers capital chances of big game shooting of a varied and interesting character; while other forms of sport, such as polo and fishing, offer attractions which are of no mean order.

In short it can be said without hesitation that there are excellent openings for a keen young gunner in Nigeria, and that he who has the opportunity to soldier there will have little cause to regret it but should, on the contrary, deem himself fortunate.

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Presentation of Colours to the Sierra Leone Battalion, W.A.F.F., 1922.

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Financially the unmarried subaltern will find himself well off. His pay and allowances amount to about £500[1] per annum. This sum is ample to cover all expenses including ponies and polo, and at the same time will allow him to save a very comfortable sum.

System of selection for service in Nigeria.

The Military Force in Nigeria consists of the Nigeria Regiment, which is itself a portion of the West African Frontier Force; the West African Frontier Force embodies all Colonial Troops serving in the four British West African Colonies, Nigeria, Gold Coast, Sierra Leone and the Gambia. The various units composing the West African Frontier Force, which is familiarly known as "WAFF," are shown in detail in the Army List; as far as the Artillery of the Nigeria Regiment is concerned there is one battery of 3·7 howitzers.

Before making an application for service it is advisable for the prospective candidate to pay a personal visit to the Colonial Office. where he will be interviewed by the Inspector General, WAFF, or one of his staff officers. He will then be given any information he requires, besides perhaps getting some idea of his chances of appointment, although of course no one can be selected without the approval of the War Office.

A limited number of artillery officers may, on first appointment, be appointed to an infantry unit pending a vacancy in the battery.

Climate and Health.

The climate varies from a moist heat on the coastal belt to a dry and intenser heat on the northern frontier, which is some 700 miles distant. It is in the latter region that the battery has its peace station, at a place called Zaria. Those who are familiar with India will find that the climate is similar to, and varies to much the same extent as that found between Bombay and Rawal Pindi.

The secret of keeping fit is to take regular exercise and to be moderate in all things. Malaria is the commonest complaint, but if the novice obeys the doctor's orders on the subject of quinine and takes care to observe the rule about exercise and moderation, there is no reason why he should be unduly bothered with fever.

[1] A slight reduction is foreshadowed this year, owing to decrease in cost of living.

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It is important to remember that the sun cannot be trifled with; a thoroughly efficient sun helmet must always be worn between the hours of 8 a.m. and 5 p.m.

Description of the Country.

Nigeria covers an area of over 350,000 square miles. As might be expected the nature of the country in this vast area varies considerably. From the seaboard for a distance of 150 to 200 miles inland is a region of dense forest and thick undergrowth, intersected near the river mouths with swamps and creeks. The forest gradually merges into a park-like country, which itself gives place to scrub and sand as the northern border is approached. The country is watered by three large rivers and their tributaries. These rivers are the Niger, Benue and Cross River. In the extreme North East is the big expanse of water known as Lake Chad. The main mountainous feature is the Bauchi Plateau, which rises to a height of some 5000 feet. The climate of the Bauchi Plateau is cool and pleasant; it is the real health resort of Nigeria.

There are two main railways and a light branch line, which serves the tin mines in the Bauchi Plateau.

One railway leads from Lagos, the capital, to Kano via Zaria. The other emanates from the port of the Eastern end of Nigeria (Port Harcourt), and is due to join the former line at Kaduna; at Kaduna is the Headquarters of the Nigeria Regiment.

Roads suitable for light motor traffic are being made as feeders to the railway lines; but in many parts of the country communications are merely "bush paths," which may often be only 4 or 5 feet wide.

Tsetse fly is prevalent over wide areas, thus precluding the use of horses. Broadly speaking, however, as one travels north fly becomes scarcer and horses are more used.

Outline of 12 months' duty in Nigeria.

We will assume that the newly joined officer has been posted direct to the artillery of the Regiment. He will then proceed to Zaria, where the battery is stationed. His tour will consist of 18 months duty in the country, during which a period of 3 weeks' leave is allowed. At the end of the tour leave to Europe is granted at the rate of one week's leave for each completed month's service,

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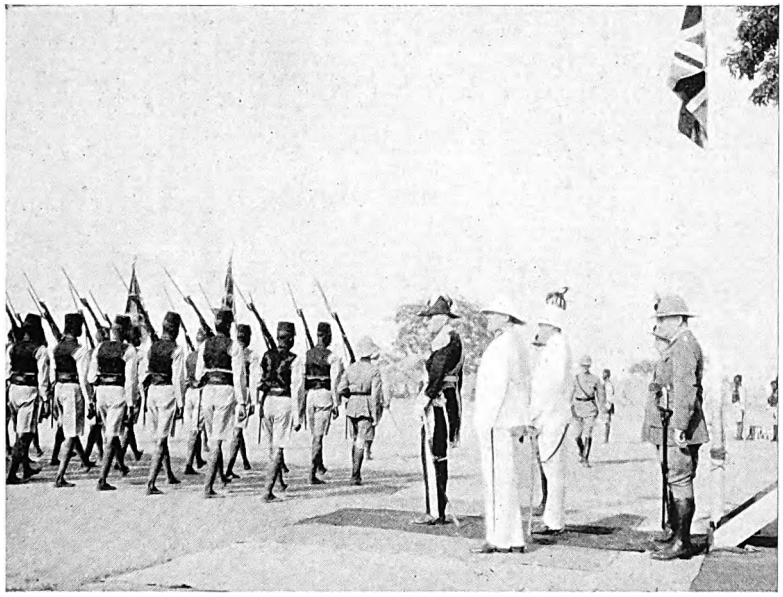
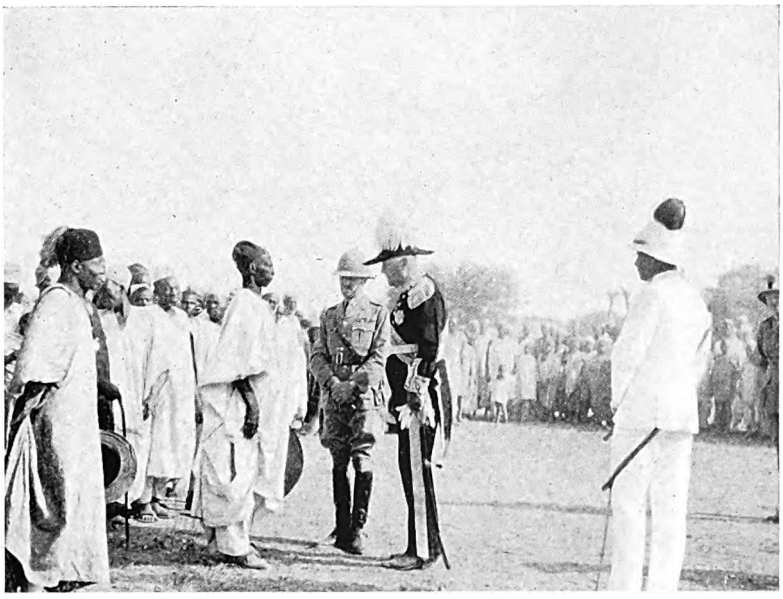


1st Battalion Nigeria Regiment, W.A.F.F., Marching Past.



The Governor of Nigeria (Sir H. Clifford) and the Acting Commandant (Lt.-Col. Badham) interviewing ex-soldiers.

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thus making a total of 4½ months' leave for a fully completed tour of duty. The time taken on the voyage to and from Europe is excluded in calculating this leave.

An officer may be seconded for a total period of six years (or 3 tours) including leave.

Zaria is typical of a good station in the Northern Provinces of Nigeria, and is generally considered one of the best military stations. A brief description of Zaria will therefore not be out of place.

Zaria is the headquarters of the province of that name. It is administered by a Resident. The native ruler is an "Emir," who is assisted by a native council and is responsible to the Resident for the political well-being of his "Emirate," or Province.

The military cantonments are situated about one mile from the town. Officers and men live in mud huts, which are solidly built, and are both cool and comfortable.

The training year begins in April, individual training is continued throughout the rainy season (June to October). In December Collective Training starts. The weather is then dry, but cool. A striking feature of this season is the prevalence of a constant Northerly wind, locally known as the "harmattan" which blows fairly continuously until March.

Battery practice and the annual regimental manœuvres take place at the end of the collective training, between January and March.

Parades start normally at 7 a.m., and continue until mid-day; in the afternoon there is probably an hour's office work; school for the men, or a short parade under section officers. After tea the wise man will see to getting some kind of recreation, for tropical evenings close in early and darkness sets in between 6 and 6.30.

The Battery; Armament, Transport and Personnel.

The Battery is equipped with 4 (3·7) howitzers. Transport is done by gun carriers, who are specially selected men of fine physique. These men are recruited from certain tribes who are used to carrying loads up to 80 or 100 lbs. for considerable distances and many days at a stretch. They are magnificent material, and take great pride in their guns. Loads are placed on bamboo slings; each sling has a horizontal strip of wood lashed across the front and

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back. This portion rests on the man's head. The heaviest loads require 2 men in front and 2 behind. The weight carried by each man averages about 60 lbs.

A battery is commanded by a captain. In addition to the captain the European personnel consists of 3 subalterns, a battery sergeant major, a fitter and a sergeant. The battery commander's staff and gun detachments are entirely composed of natives.

The men are recruited from the best fighting tribes in the country; they are mostly Hausas. They are sturdy, very keen and smart in their turnout. On the whole they learn well, but it takes three or four years to produce a well-trained gunner. The West African soldier makes a good signaller, although writing down messages is a weak spot in his training. He usually can be taught to write fairly well in block capitals, but quick writing in running hand is beyond his powers.

These men can be trained to be good gunlayers and fuze-setters, while the detachments become extremely smart at drill. The N.C.O's are capable of commanding a section, they are also taught to range and fight the battery, although normally the duties of B.C. and section officers are of course performed by the British officers. The Nigerian gunner is a brave, loyal and efficient soldier, whom it is a pleasure to train and command. He has little knowledge of English; it therefore behoves the officer to learn Hausa.

The European personnel of the Battery is mounted, together with the B.C's staff, the rest of the battery is dismounted. Experiments were being tried with a section in draught, but it is not considered sound to depend entirely on horses for transport owing to the prevalence of tsetse fly, which has already been alluded to. Zaria itself is fly free, as are considerable areas in the Northern districts, at the same time the battery may at any moment be called on to serve in a fly infested region, consequently it would be foolish to rely on horses as opposed to carriers. Mules have been tried in West Africa, but are not suited to the climate.

Active Service in Nigeria.

From the point of view of an officer serving with the battery it can not be said that the chances of seeing service nowadays are likely. Small infantry columns are usually sufficient to cope with

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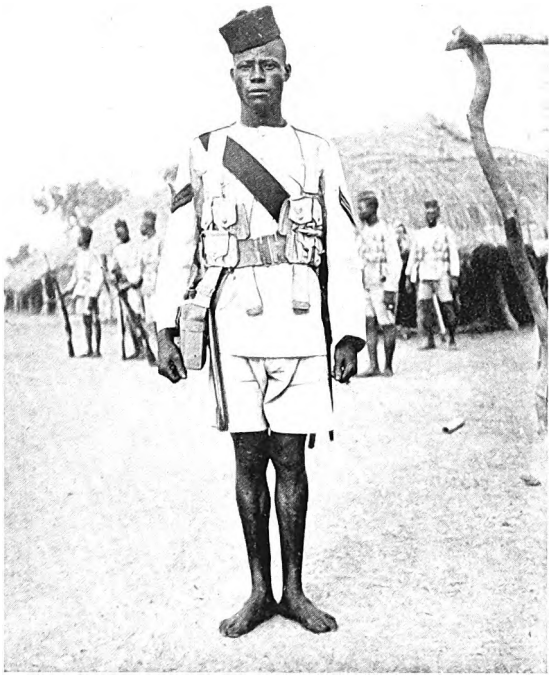

A Sergeant of the Nigeria Regiment.

Signaller of the W.A.F.F.

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the minor operations in which our troops may probably be involved. Still there is always a sporting chance, in an undeveloped country such as Nigeria, that a big tribe may, for some reason or other, revolt "en bloc," or some organised movement, such as a Muhammadan rising, may break out. A disturbance of this nature would certainly involve the employment of artillery. The rôle of guns in savage warfare must always be a bold one, therefore the gunner would pretty certainly find himself well to the fore. In bush fighting some of the artillery must be kept close to the front of the column; not only because the opportunities of coming into action are likely to be fleeting, but also because it is difficult to move guns quickly forward owing to the paths being narrow and gun loads cumbersome.

Short résumé of the history of the Artillery in Nigeria.

The Battery of the Nigeria Regiment has a high sense of "esprit de corps." When we consider its history we see that it has just cause to be proud of its achievements in the past, its present high state of efficiency and its potential value as a unit of the Nigeria Regiment in the future.

Artillery has formed a part of the Nigeria Regiment since the West African Frontier Force was raised by Colonel Lugard, now the Right Honourable Sir Frederick Lugard, G.C.M.G., C.B., D.S.O., in the year 1897. In that year the European Powers were scrambling for possessions in West Africa, and at the time our relations with France were decidedly strained and led up to the Fashoda Incident, which will still be fresh in the memories of many officers.

It was decided by the British Government to raise and equip a highly trained body of West African troops in order to maintain our military position in Nigeria and to ensure that our treaty rights with the Native Chiefs of the interior were not infringed by foreign Powers. At that time Nigeria consisted of the three separate countries, Lagos, Northern Nigeria and Southern Nigeria. Between that date and 1900 four batteries of artillery were raised; two formed part of the Northern Nigeria Regiment, while two formed part of the Southern Nigeria Regiment. In Lagos there was an infantry battalion, but no battery. All four batteries were armed with the 2·5 inch R.M.L. gun. The Colony and Protectorate of

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Lagos was amalgamated with Southern Nigeria in 1906, when the Southern Nigeria Regiment absorbed the Lagos Battalion. Later, in 1913/1914, Northern and Southern Nigerias were amalgamated into the existing Colony and Protectorate of Nigeria. The Southern and Northern Nigeria Regiments then became the present Nigeria Regiment. The original four batteries have been gradually reduced, from four to two, then from two to one. Batteries were re-armed with the 2·95 B.L. gun in the early part of this century, while the 3·7 howitzer was introduced after the Great War.

From the beginning of its existence in Nigeria the Artillery played an important part in the numerous military operations which took place during the development of the country. In 1897 it was used most effectively in Major Arnold's expedition against Bida, both to disperse the Emir of Nupé's mounted spearmen and to batter the walls of the city. In 1898 it was used by Colonel (now General Sir Thomas) Morland, in his expedition to Bornu, when the power of the Filani slave raider, Othman dan Fodio, was broken and the territory forming the North Eastern portion of Nigeria was brought under British control.

In 1899 it was used to shatter the power of the King of Benin, who was a blood-thirsty ruffian greatly addicted to human sacrifices.

In 1900 it took a prominent part in the Ashanti Expedition, under the soldier who is now Sir James Willcocks.

From 1900 onwards there were innumerable minor operations, throughout the Nigerias in most of which the guns were an important factor. Of these the Kano-Sokoto Expedition in 1902/3, commanded by the gunner General Sir G. V. Kemball, and the Aro Expedition, also commanded by a gunner, who is now dead, Colonel Montanaro, are perhaps the most noteworthy.

The batteries of the Nigeria Regiment finally capped all their previous feats of war by the distinguished part they played in the Cameroons Campaign of 1914/16, and the East African Campaigns of 1916/18.

Since the Great War the battery of the Nigeria Regiment has had a period of peace, during which it has been re-equipped with a new weapon requiring more technical knowledge than the comparatively simple 2·95 gun, together with a higher all-round standard

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of training. As a result the unit possesses far greater potential value than did the two Nigerian batteries of pre-war days.

Sport in Nigeria.

The keen sportsman will find plenty of attractions in Nigeria As compared with Europe, and also I should imagine India of nowadays, polo, fishing and shooting may be had at a very small cost.

Polo.

The price of ponies has increased since pre-war days in Nigeria, as elsewhere. Nevertheless it is possible to buy raw ponies at prices ranging from about £7 to £20, according to the district where they are bought. The best ponies come from the North. The provinces of Kano and Sokoto in the North-West, and Bornu in the North-East, probably produce better horse flesh than any others. The West African pony is generally not much quality to look at, but has a remarkable amount of stamina for his size. A pony of 14 hands is a good sized animal. The native is accustomed to riding his horses with a cruel bit; thus ponies are usually difficult to handle at first, but quickly quieten down with a white rider. They take to polo kindly, consequently the patient man will often produce a capital polo pony in a short time. Polo is played at all the bigger stations. Lagos, Ibadan, Kaduna, Zaria, Kano, Lokoja, Sokoto and Maidugari are all good polo centres and are all military stations. Indeed it is practically entirely the soldier who gets polo going.

Racing.

The Nigerian Turf Club holds several meetings in the year. Racing is very popular and is supported strongly by the WAFF. There are race courses at all the stations where polo is played.

Fishing.

On the sea coast good tarpon fishing can be had. The biggest tarpon I have heard of authentically was caught off Lagos and weighed 105 lbs. There is no doubt that tarpon run much bigger than this. They will certainly give the enthusiast all the sport he wants. The one I have mentioned took about two hours to land. In the big rivers "Niger Perch" weighing as much as 150 lbs. have been caught on a line.

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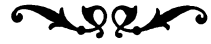
Shooting.

The francolin partridge, commonly called "bushfowl," guinea-fowl, several varieties of pigeon, sandgrouse, bustard, duck, geese and snipe are all found in considerable numbers over the greater part of Nigeria. On the big waterways, the Niger and Benue, as well as on the lakes in the Sokoto province, there is excellent duck and geese shooting at certain times of the year. It is, however, in its big game shooting that Nigeria will probably interest the young sportsman most. It has been my good fortune to have had the opportunity of hunting big game over the greater part of the country, and many a good day's sport have I had. As a great deal of the hinterland is thickly populated it is only to be expected that wild animals are confined to certain areas where mankind is scarce. There is, however, a large variety of big game, including elephant, lion, buffalo, leopard, rhino, giraffe, hippopotamus and many species of gazelle and antelope. To my mind the best hunting districts are in the Benue valley between Lokoja and Yola, and in the region of Lake Chad. The keen shikari will, however, generally find that he can get sport within a few days' reach of any place outside the forest belt. A heavy cordite rifle of not less than ·450 calibre for elephant and dangerous game is strongly recommended; while a light sporting rifle or service ·303 is ample for the ordinary antelope. A solid bullet is essential for the thick-skinned dangerous game. For thin-skinned game a soft nosed bullet, or one that breaks up easily is what is required. Probably the most dangerous and most cunning animal in Nigeria is the "bushcow," generally known outside West Africa as the buffalo. The sportsman who is a novice at hunting these beasts is strongly advised to exercise the greatest care in how he approaches them. A wounded "cow" in long grass has caused the death of many an ardent hunter.



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WIRELESS.

By Lieut. A. S. C. Hill. R.A.

THE object of this article is to explain how wireless can amuse and interest the average officer, and, more particularly, how that amusement may be obtained at the minimum cost, and with the minimum knowledge of the subject.

In the semi-technical journals, articles are often written on the choice of a wireless set for a beginner. These articles, though, do not usually reach the public for whom they are designed, as one who has not yet cultivated an interest in the subject is not likely to see the journals. This then, will explain why such an article finds its place here. The interest in the technical and pleasurable sides of the subject is rapidly growing in the Regiment, and many officers are purchasing sets for the reception of broadcasting.

There are three main ways of obtaining sets:—Making a set, getting a friend to, and buying one. And yet, before doing any of these things it is absolutely necessary to know the limitations of the various types, and the cost of refinements. Most people want a loud speaker, but few are aware of the money it costs to amplify signals from head telephone strength to loud speaker strength.

The writer hopes to be able to clear the doubt about the above points. The following table shows the smallest size of set which will, with a standard aerial (which will be explained later) give a definite result.

In each case the performance of an average set is given. There are many special circuits which will, if handled carefully, give much better results. If an indoor aerial is necessary the distance from

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Distance in miles from furthest station it is required to receive.	Head telephone strength.	Weak loud-speaker.	Strong loud-speaker, or 3 loud-speakers. (the last valve in each case is a power valve).
20	Crystal.	Crystal & 2 valves. 2 valves.	3 valves.
60	1 valve.	3 valves.	4 valves.
200	2 valves.	3 valves.	4 valves.
600	2 valves.	4 valves.	4 valves.

which the above sets will receive is much less, and cannot be laid down, as there are many circumstances which govern it.

With regard to a crystal set. This is the simplest type of set for receiving purposes that one can possibly have. There are no batteries, and there is no upkeep cost. Such a set can be made for three or four shillings, and no special skill is required. There are many cheap books published which will explain in detail how a person of no mechanical ability can make a set that will work. A crystal set must have a good aerial and earth, and cannot be expected to work on an indoor aerial unless it is in the immediate neighbourhood of a broadcasting station. A pair of good telephones may be purchased for twenty-five shillings and the cost of an aerial of the best materials need not exceed five shillings, provided that no masts are required. In barracks chimneys are usually available.

A very large number of present day wireless enthusiasts started their experience with cheap crystal sets, and there is no doubt that much amusement can be had with them.

With these sets, as with all others, the better the components and design, the better the results. The crystal set, too, can form the nucleus of a larger set, which can be built up as opportunity and cash offers. Space will not permit of a complete description of how a wireless set works, but a crystal has the property of only conducting current in one direction, and is therefore called a rectifier, or, more commonly and erroneously, a detector. The crystal is usually held in a cup with a small wire pressing on the exposed face. This wire is

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called a "cat's whisker." A crystal is not sensitive all over, and the pressure of the wire makes a sensible difference to the strength of signals. It is therefore better to have a detector that allows for adjustment of this pressure by some screw device. It is of advantage if there is an arrangement whereby the set can be used for the reception of signals of a longer wave length. Those that can read Morse may derive much pleasure from listening to commercial messages. A crystal set will receive many such, as these stations as a rule use more power than the broadcasting stations, and so are audible at greater distance. Amateurs used often to listen for the Paris time signals in this way. Since the British Broadcasting Company now broadcast Greenwich mean time nightly, this is not of the interest that it used to be.

A crystal set will not operate a loud speaker.

Let us now turn to valves. Valves can be used to rectify signals, like a crystal, or amplify them before or after rectification. If the reader is already in possession of a crystal set he may employ a valve in two ways. He may amplify his rectified current—i.e., make his signals stronger after rectification or he may amplify before rectification. In the first case the range of the set will not be increased at all, only all audible signals will be strengthened. In fact a one valve amplifier of this type will just operate a loud speaker where the set is close to a broadcasting station. Such an amplifier is called a low frequency amplifier. Two valves in series, technically called cascade, may be used. Little advantage is gained by using more, as the last valve can be arranged to give as great an amplification as is generally required. A valve arranged in this way is called a power valve, and is more expensive than an ordinary one, although even an ordinary valve gives much greater amplification when wired as a power valve. A power amplifier complete with valves, batteries and loud speaker may cost up to twenty pounds to buy, and about three quarters of this sum to make.

A crystal will not rectify very weak currents, and, therefore, if it is desired to receive stations outside its reach it is necessary to amplify the current before it reaches the crystal. This form of amplification is known as high frequency amplification. With a good aerial such a set could receive all, or nearly all, the B.B.C. stations from anywhere in England. The vast majority of sets that

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employ high frequency amplification only use one stage; i.e., one valve.

The difference between the two forms of amplification are, then, that low frequency amplification increases the volume of sound and high frequency the range. It is peculiar that, when close to a station, high frequency amplification does not seem to operate so efficiently as when far from a station. It is most unlikely that a set employing a high frequency valve and crystal will ever operate a loud speaker. Therefore, if the owner is near a station he has to make up his mind as to whether he wishes to make his local station loud, or receive more stations weakly. At this point it would be as well to mention that, when situated very close to a station, it is extremely difficult to tune it out. If the distant stations are required, it is as well to bear in mind that it may only be possible to hear them when the local station is silent. The cost of a high frequency amplification valve and equipment complete is about seven to ten pounds.

The combination of H.F. crystals and L.F. gives a good set that costs about ten to fifteen pounds. The cost seems out of proportion to the two units taken separately, but the same batteries will do for both valves.

A circuit called a reflex has been designed embodying a valve and crystal where one valve does both high frequency and low frequency amplification. The writer has never made one of these, but has seen and worked a proprietary set of this type. It appeared to be quite efficient and easy to work. It would cost about two pounds ten shillings less to make than a set with two valves and a crystal, and should be as efficient.

A valve is a better rectifier than a crystal, as it amplifies to a certain extent at the same time. It is also more sensitive to weak currents. It is though, very much more expensive. It has the merit that it does not require the nicety that the best type of crystal set requires to get the "Cat's whisker" in adjustment. Apart from the first cost of a valve set there are maintenance charges to be met. Valves burn out, and have to be replaced. Batteries run down, and have to be recharged or replaced. It might be well to mention here that there are two main types of valves: ordinary ones requiring accumulators and "dull emitters" that will work off dry batteries.

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If the owner buys or makes a set the ultimate cost is in favour of the dull emitter. They are more expensive to buy, but dry batteries are cheaper than accumulators. The other batteries required in the set need not be so big either. Both types are equally efficient. The writer has recently made three sets with dull emitter valves incorporated in their construction, and they are very satisfactory. The inevitable messiness, bulk, weight and general bother of accumulators is saved.

If a valve set is made or purchased at all it is well worth the extra expense of two valves. The arrangement of them lies in the hand of the owner, and the same considerations apply as in the case of the crystal set and one valve. When close to a station one rectifying valve and one amplifying valve will give a good volume of sound on a loud speaker.

We will now turn to multivalve sets. There is little doubt that the most popular all round set is the four valve, arranged with one high frequency valve, one rectifying, and two low frequency. The last valve is best wired so that a small power valve can be used. Many proprietary sets are so arranged. With such a set the owner is assured of receiving at loud speaker strength most things of interest that are broadcast in Europe. The difficulty of tuning out a station very close may still present itself. This can be got over to a large extent by special tuning arrangements. Full details of this, and many other things not touched on here, can be found in the special handbook for beginners. *Complete* in a cabinet, such a set will cost to make, about twenty-five pounds, and anything up to double that amount to buy.

With regard to aerials the Post Office have laid down that an aerial must not exceed one hundred feet, including the lead from the aerial itself to the point where it is led in through a window. The gain of a much longer aerial is not great, and may be a definite drawback. Good insulation of aerials is essential and full information can be had from the handbooks. Every set employing an outside aerial must have a good connection to earth. It is of the utmost importance that it is a good one. Two good types are a wire soldered to a biscuit tin buried in the earth, and well watered, or a good connection to a water pipe. Apart from the danger of connecting to a gas pipe, it is not advisable as the red lead in the joints

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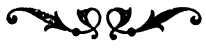
often leads to lack of electrical continuity between the set and the earth. A switch must be arranged so that the aerial can be joined straight to earth. In the event of a thunderstorm this saves the set from damage, and lessens the change of fire.

We have appended the titles of six books published by the Wireless Press, Limited, 12-13 Henreitta Street, that will prove of interest to those who wish to acquire a knowledge of both the theoretical and practical sides of the subject :—

"The A.B.C. of Wireless." 6d.
"Your Broadcast Receiver and how to work it." 6d.
"Crystal receivers for broadcast reception." 6d.
"Construction of amateur valve stations." 1/6.
"Practical wireless sets for all." 1/6.
"Mast and aerial construction for amateurs." 1/6.



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THE ROCK.

Continued from the March Special Number of the Journal of the Royal Artillery.

By Major-General J. C. Dalton, Col. Commdt., R.A.

AS the matter for the various articles and papers contributed to the "Special Number" of our Journal had necessarily to be limited—though I was generously treated in the amount of space allotted me, for which I was grateful—I have been allowed to supplement my previous article by a few more notes in the shape of records and reminiscences which I had to crowd out then. I propose to commence by three short biographical notes, (1) as to the talented artist of the two hunting scenes which I am privileged to reproduce, and (2) of the two distinguished "Gunners" who are prominent figures in the first of these pictures. After that is done I intend to follow the same headings as in my first part.

1. General Sir Charles W. D. Staveley, G.C.B., Colonel 44th Regiment, was born in 1817, the son of a distinguished Waterloo officer, and educated at the Scottish Military and Naval Academy, where he was early noted for his talent for drawing. He entered the army in the 44th Foot in 1835, and after a varied foreign service found himself as a major in Gibraltar in the early fifties and became a member of the Calpe Hunt in 1852. Thence presumably he went to the Crimea in 1854 and took part in the battles of Alma and Balaklava and siege of Sebastopol.

He was a Brigadier-General in China in 1860 in command of the force employed against the Taepings near Shanghai, and in his capacity as Commander of the Chinese Army of Occupation he was called upon to nominate an officer to command the Chinese army and selected Charles ("Chinese") Gordon, little foreseeing the national significance of his nomination!

In 1867-8 he was chosen by the first Lord Napier of Magdala, a future Governor of Gibraltar, to be his second-in-command of the expedition to Abyssinia, and received the thanks of Parliament and promotion to Major-General.

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In 1869 he took over command of the Western District, commanded the army assembled on Dartmoor in 1873 for the extensive manœuvres of that year, and died full of honours in November, 1896. Whilst at Gibraltar he was a keen supporter of the Hunt and also owned one of the most successful race-horses, *Vengeance*.

A contemporary local paper recording his death describes him as having "the animation of a boy and keen sense of fun . . . . greatly beloved . . . . gay courage and polish."

2. COLONEL W. CATOR, C.R.A. (K. 1134), was commissioned in the R.A. in 1803, served at Walcheren and Flushing in 1809, arrived at Cadiz in February, 1810, and served through the Peninsular war including siege of Cadiz, battles of Barrosa (*w*), Vittoria, Tolosa, Pyrenees and Bayonne, 1814. When at Cadiz he was a member (probably master) of the *Isla de Leon Hunt*. In 1848, as colonel, he was given the command of the R.A. in Gibraltar, being then 63 years of age. But age in no way deterred him from entering keenly into all the sports of the garrison. He was Master of the Calpe Hunt 1850-2. He left the Rock 14 April, 1852, straight away to the steamer from the judge's box on the race course, and was described in the *Gibraltar Chronicle* of the 20th April as "our leading sportsman." Major Staveley's spirited sketch probably depicts his last day with the hounds as he is in *mufti*, but notwithstanding his age—then 67—he is evidently well up in the first flight, and is seen mopping his grey head after a fast run late in the season ! After 7 years as Director-General of Artillery, he died a general, Col. Commdt. and K.C.B., in 1866. For a brief space he held the appointment of Brig.-General C.R.A. of the expedition to the Crimea, but after all the hard work of organization at Varna his health gave way and he had to return home on the eve of sailing for Balaklava.

3. CAPTAIN A. T. PHILLPOTTS, R.A. (K. 1848), joined the Regiment in 1834 and had much foreign service including the Syria campaign of 1841. He went to Gibraltar in 1850, and joined the Calpe Hunt as member, and was honorary secretary and treasurer 1851-3. He served in the Crimea in 1855 including the siege of Sebastopol. He was Inspector General of Artillery 1877-80, and died in 1890, aged 75, as general and Col. Commdt. After Col. Cator's resignation of the mastership on getting his orders for home,

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Phillpotts evidently acted as M.F.H. and was presented on leaving in December, 1852, with a gold mounted hunting crop by the Hunt.

I. Historical.

In 1462 Gibraltar was in the hands of the Moors when the Spaniards under the Duke of Medina Sidonia laid siege to the place (*the eighth siege*), captured and garrisoned it, after which King Henry of Castille annexed it to the district of Algeciras. In the year following he visited Gibraltar in person and appointed officers to administer this latest addition to the royal dominions.

However, it was not long 'ere a period of anarchy arose in Spain and the predominant party proclaimed the youthful Infante Don Alonzo, king, who nominated the duke of Medina Sidonia as possessor of the city and territory of Gibraltar in perpetuity. But the duke when proceeding to take over his property was resisted, and it took him him 14 months (*ninth siege*) to establish himself there. King Henry died in 1466 and his successor, Henry IV of Castille, confirmed the duke in the ownership of Gibraltar, but at the same time retained his sovereign seignorial rights[1].

King Fernando and Queen Isabella on coming to the throne in 1474, though they coveted Gibraltar, confirmed the second duke in his rights, but on his death in 1492, tried to cajole his successor into a deal in order to secure the *Peñon* for the crown, but it was not till 1502 that Gibraltar was formally annexed. The dispossessed 2nd duke rebelling against the usurpation, entered on a *tenth siege*, but failed and had to eat humble pie and publicly make restitution when he was forgiven by the Queen who then, in recognition of its valiant defence, conferred on the city the title of "most loyal" and a seal of which the blazon is "*A Castle with a Golden Key pendant*," and, inscribed on it, "*Seal of the Noble City of Gibraltar the Key of Spain.*" [2] It remains now not only the key of Spain but of the Mediterranean ! This device continues to be the official badge, and with its motto of *Mons insignia Calpe* is borne on the colours and devices of those regiments that participated in the sieges which secured it to the British crown.

[1] See Gilbard's notes in the annual "Gibraltar Directory," the information in this valuable summary being largely taken from Drinkwater, whose "Siege of Gibraltar" is the basis of all works on this subject.

[2] According to Gilbard it would appear that the "Key" was an ancient symbol for Gibraltar during the Moorish occupation.

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In 1704 Gibraltar passed into the hands of Great Britain, and though her right to its possession was severely challenged in 1727 and again in the great siege of 1779-83, it remains a happy and prosperous crown colony with a considerable amount of self-government in the shape of a constitution and executive council, and lives on excellent and friendly terms with its Spanish neighbours.

It is not perhaps generally known how frequently after Gibraltar was definitely ceded to us in 1713 by the Treaty of Utrecht there were efforts made to exchange it, for we read that George I was in 1715 ready for a barter which in 1721 actually took the extreme form of proposing to exchange Gibraltar for Florida, then a Spanish-American settlement. Spanish pride, however, declined any conditions other than restitution.

Then after our successful defence in 1727 things were fairly quiet till in 1757 Mr. Pitt again revived the idea of surrender for certain political equivalents, but the glamour of the possession of this famed fortress had given it so great a prestige and sentimental value in the mind of the nation as to cause those in power to think twice before risking their position by suggesting the surrender of this dearly bought acquisition. Then the "Great Siege" and the wonderful heroism and sacrifices it revealed still further enhanced the pride felt by all Britons in the ownership of this impregnable guardian of our maritime route to the Mediterranean, the value of which has become infinitely more pronounced since the Suez Canal was cut.

Notwithstanding all this, many of us, like myself, are old enough to recollect that no less a person than Mr. W. E. Gladstone (who gave up the Ionian Islands) was credited with an idea of exchanging Gibraltar for Ceuta, and not infrequently since the Great War has one seen letters in the public press reverting to ideas of a similar nature. These may be treated as grumblings of distant thunder which happily do not develop.

There are various anecdotes and curious old orders in connection with the sieges and early occupation by the British forces of "The Rock" which have been extracted from different contemporaneous journals, diaries, and old "order books." Many of these are quoted by the late Col Gilbard in his "Gibraltar Directory."

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These *facetiæ* (for such they may now be styled) are as a rule taken from Drinkwater's *magnum opus* on the Siege of Gibraltar, Spilsbury's diary (1779-83), &c., and many have already appeared in various publications such as the Journal of the "Society of Army Historical Research," certain regimental magazines, e.g. Green Howard's Gazette, "The Thistle," etc. I propose therefore only to quote one or two here in the hope that they may be new to most of my readers.

"A bombardier by sentence of a Court Martial was reduced to serve as a matross and to receive 300 lashes with the cat with nine tails for playing the quack and giving opium pills to a soldier contrary to orders, but recommended to mercy on account of his long service of over 40 years.

1726. "For the convenience of quarters, the Regiments of Mark Kerr, Egerton and Bissett that are in barracks to put three men in a bed and as many beds in a room as possible, to be removed in the morning.

Spilsbury,[1] in his diary, has the following: "During the extreme scarcity of provisions, a singular mode of hatching chickens was practised by the Hanoverians. The eggs were placed on some cotton wool or other warm substance in a tin case of such construction as to be heated either by a lamp or hot water; and by a proper attention to the temperature of heat, the eggs were commonly hatched in the usual time of the hen's sitting. A *capon* was then taught to rear them; the feathers were plucked from his breast and belly, he was then scourged with a bunch of nettles and placed upon the young hatch whose downy warmth afforded such comfort to the bare and smarting parts that he from that period reared them up with equal care and tenderness as if they had been his own offspring."

It seems not altogether surprising that this ingenious, if cruel, device should have originated from the gentle Boche of those days. Even if this should not prove to have been the earliest form of *incubator*, surely it must have been the most original type of *foster-mother*, and, like so many other inventions, may be said to have been "made in Germany"!

[1] Capt. Spilsbury was an officer of the 12th Foot and kept a regular diary of the "Great Siege." Capt. (now Maj.-Genl. Sir) John Adye, R.A., a century later, edited this journal and published it in a small pamphlet when on his father's staff, 1883-6.

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Description of Frontispiece.

OLD print (coloured) of the Siege of Gibraltar, of French origin, shewing the attack in progress of the land front by the combined Spanish and French forces, also their camp on the western beach and the fortified Spanish lines.

In the bay are to be seen various men-of-war and also the "Noah's Ark"-looking battering ships, all heavily armed, which poured in a destructive fire on the shore defences and town, and were finally destroyed by the Royal Artillery firing red-hot shot in the final attack which decided the long struggle, in favour of the defence, in 1783.

This picture is unfortunately deficient of the last word or two of the title as well as the reference table explanatory of the numbers which will be noticed scattered over the face of the engraving, the execution of which is very primitive.

The title is as follows:—

"Vue de la Montagne et de la Ville de GIBRALTAR attaquée par terre et par mer, par l'armée Espagnole et Française aux ordre[s de . . . . et du Duc de Crillon].

"Le Siége de cette Place a été commencé au Mois de Juillet 1779 sur Mer et sur Terre par l'Escadre Espagnol aux ordres de Dom-Barcelo, L'Armée de Terre commandée par Dom-Joachim de . . . ."

N.B.—The picture was given me by the late Maj.-Genl. Sir Coleridge Grove, K.C.B. I have another, very similar, but German, which has the full reference notes, but it is too large to reproduce for this sized book.

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II. Professional.

The accompanying table[1] is interesting as evidencing the very exiguous armament of Gibraltar in the year 1720, only 7 years before the determined attack by Spain, assisted by France, in 1727. The writer of the covering letter, which though undated, it is not difficult to place as being written in 1720, was William Horneck, an officer (Engineer) in the Train of Artillery with the rank of captain, and the Governor to whom it is addressed is Brig-Genl. Richard Kane.

William Horneck began life in what became the 11th (Devonshire) Regiment, about 1708, was Engineer in Placentia 1715, and in a similar position in Gibraltar 1718-20, when he was transferred to Minorca. He must therefore have come under the governorship of Kane before 1720, because he says in his letter that he had been in the garrison "twice 14 months." As Horneck had a son called Kane William one may assume that he was on friendly terms with the Governor and probably called his son after the latter. Horneck remained on the regimental list of the 11th for some years, as he appears as the senior lieut. in the regimental list of 1740.[2]

He became a sub-director according to the R.E. Corps List of Officers and died in 1746 as a Major-General, being buried in Westminster Abbey with his father, who was a german and prebendary of Westminster.

BRIG.-GENL. RICHARD KANE, a veteran of Marlborough's campaigns who started life in 1689 as Lieut. in Skeffington's Londonderry Regiment and took part in the defence of Derry. He was in the Royal Irish regiment at Namur and Blenheim, was wounded in both and commanded the regiment at Malplaquet. He was a Lieut.-Governor of Minorca in 1712, Commandant of Gibraltar 1720, and Lieut.-Governor 1725, Colonel of 9th (Norfolk) Foot, Lieut.-Governor for second time of Minorca 1730, and died there 1736.[3]

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[1] From an original document in my possession. J.C.D.

[2] See C. Dalton's "English Army Lists and Commission Registers, 1661-1714," Vol. VI *(bis)*, also his "George the First's Army," Vol. II, p. 144, Also, for Horneck, see Porter's History of the Royal Engineers and R.E. "List of Officers."

[3] See Dalton's "English Army Lists and Commission Registers, 1661-1714," Vol. VI, p. 79 *(bis)*, also his "George the First's Army," Vol. I, pp. 241 and 248. For Richard Kane see latter, Vol. II, p. 144.

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The Royal Irish, a magnificent regiment, not only for its achievements but for the physique of its men has, alas! been lost to the British army, having been disbanded with others, horse and foot, on the signing of the treaty which converted the larger half of Ireland into a "Free State." We are irresistibly reminded of an old "chestnut" but one worth repeating, though I cannot vouch for the truth of it! It was narrated in a rich brogue by a soldier in that regiment who was referring to an occasion when a large force of British troops were being passed in review before a certain foreign Queen who was considered to be a good judge of a fine man when she saw one. As the various units passed, the Queen carefully scanned each. In the language of the narrator:—"Who's thim?" said she to the Gineral." "Thim's Her Majesty's Life Guards, Mam;" but divil of a response till suddent she started from her sate—"WHO'S THIM?" she scramed. "Thim's Her Majesty's Ryal Oirish, Mam." "Bloody wars!" said the Queen of ——.

Captain Horneck's letter is as follows. The date may be taken as 1720.

Add. MS. 23637. ff. 6-9.
f. 6.

Sir,

I Return You the disposition which you honoured me with the perusal of.

I must own I Suffer a private disgrace by it, Since in 14 days you are grown a better master of this place than I in twice 14 months.

There is only one fault in it, and that is, it admits of no compliments which people are fond of making to their Governours, but is in truth the plainest and most compendious regulation I ever saw.

I Shall minute down the numbers of men, and quantity of ammunition, and wait on you by and by, with the new remain of stores, which is now perfected.

I am with great Respect
Your most Obed^{t} humb^{e} Servt
Wm HORNECK.

I have kept the disposition for the Traine and bring it with me.

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(f. 7.)

An Abstract, of the Number, and Natures, of Gunns on the respective Battery's at Gibraltar (being all Iron) with the Number of Serviceable Carriages.

Natures	Numb. Mounted	Numb. Unmounted	Carriages Serviceable Standing	Carriages Servicble Sea	Carriages Repble Do.	Carriages Do. Unserble	Where placed	Total at each place
18 Pounders	2	,,	2	,,	,,	,,	Willis's Battery	12
4 Ditto	10	,,	8	2	,,	,,		
6 Do.	2	,,	2	,,	,,	,,	Above the Castle	2
6 Do.	3	,,	3	,,	,,	,,	Round Tower	3
6 Do.	1	3	,,	,,	,,	1	Prince's Battery	4
6 Do.	8	,,	8	,,	,,	,,	Brittons Battery	8
12 Do.	9	,,	9	,,	,,	,,	Queen Battery	9
12 Do.	4	10	2	,,	2	,,	North Bastion	14
32 Do.	7	,,	7	,,	,,	,,	Old Mole	7
32 Do.	,,	4	,,	,,	,,	,,	Upon ye Line	8
4 Do.	4	,,	4					
18 Do.	10	,,	5	5	,,	,,	South Bastion	12
4 Do.	2	,,	2	,,	,,	,,		
4 Do.	2	,,	2	,,	,,	,,	Above South Port	2
18 Do.	4	,,	4	,,	,,	,,	Eight Gunn Battery	4
32 Do.	14	,,	14	,,	,,	,,	New Mole	14
18 Do.	2	,,	,,	2	,,	,,	Att Rosea	4
12 Do.	2	,,	,,	2	,,	,,		
12 Do.	2	,,	,,	2	,,	,,	Att ye Camp	2
18 Do.	3	,,	,,	2	1	—	Europa	10
12 Do.	7	,,	,,	2	5	—		
	98	17	72	17	8	1	In the Whole ...	115

An

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(f. 7b.)

An Abstract of ye Nature, and Number of ye Iron, and Brass Mortars in Gibraltar.

Natures	Numbr Mounted	Numbr UnMounted	Carriages Servicable (*sic*) Brase	Carriages Servicable (*sic*) Iron	Carriages Servicable (*sic*)	Place Where	
13 Inch Mortar	2	—	—	2		Round Tower	2
13 Do.	4	—	—	4			
10 Do.	2	—	2	—		Bomb Battery	10
8 Do.	4	,,	4	—			
Coehorns	13	—	13	—	—	Bomb Battery	45
Coehorns	32	—	—	32			

Pieces of Cannon Mounted on ye Batterys	98
Do Unmounted	17
Att ye Signall house	1
Att Middle Hill	1
Warning Gunn on ye Queen's Battery	1
Divells Tower	1
Tower by ye Strand	1
In all ...	120

Endorse-

[Endorsement on f. 8b.]

An Abstract
of the Number and
Natures of Guns
at Gibralter
&
Mortars.

[Endorsement on f. 9b.]

Capt. Horneck
upon the Enquireys
& Dispositions
at Gibralter

[Addressed]

The Honle Governr Kane

These

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In the "Journal of the Society of Army Historical Research" for July, Lieut.-Col. J. H. Leslie reproduces from a MS. book, the property of the War Office, a unique daily journal of the siege of Gibraltar by the Spaniards in 1727, and other valuable details bearing on the same subject, together with a list of the ordnance, dated May 28, 1727, which was then mounted in the fortress and fired from. As this is a short list I am reproducing it with his permission as well as a few more notes from his very interesting article, which is well illustrated and would amply repay all interested in historical research, *especially* as regards Gibraltar, to obtain and peruse. This siege has already been briefly alluded to by me in the "Special" (March) No. of the R.A. Journal of 1924, so that I do not now propose to do more than extract one or two items from Col. Leslie's paper above mentioned.

The *thirteenth* siege of the famous "Rock" actually began on the 11 February 1727 (O.S.), but the Lieut. Governor, Brig.-Genl. Richard Kane—whom I have already mentioned in the early part of this paper, and who was still serving in Gibraltar in the absence, on leave, of the Governor, Lieut.-Genl. Lord Portmore,—was in supreme command, and in December 1726, realizing an ominous concentration of a considerable Spanish army, on the plains of San Roque, evidently with hostile intentions, he deemed it high time to take defensive measures, which were badly needed, to prepare to meet any emergency. Meantime, Kane's successor, Brig.-Genl. Jasper Clayton, was on his way out, and arrived on February 3, 1727, with timely reinforcements to relieve Kane, who, on February 23 left for Minorca to take up a similar post, actual hostilities having already commenced on Feb 11.

The Governor, Lord Portmore,[1] arrived on April 21, and took over from Clayton. The Spanish commander, Conde de las Torres, who kept steadily concentrating his forces—now some 15,000 strong —and was beginning to construct batteries, had been asked his "reasons in writing" for his apparent unfriendly intentions, and as he gave a defiant reply to the effect that he was "on his master's ground" and free to act as he thought best, the Lieut. Governor ordered guns to be fired over his camp, and the "Bloody Flag"

[1] Lord Portmore had been the nominal Governor of Gibraltar since 1706, but apparently was employed elsewhere, and Gibraltar was administered by Commandants and Lieut.-Governors.

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was hoisted on the Flag-ship by Admiral Sir Charles Wager on February 11, 1727, from which date the siege progressed merrily, chiefly as Col. Leslie says, confined to *long bowls* between the opposing artilleries, which in our case consisted of Capt. Holman's company of R.A. assisted by some naval guns on shore and afloat. The batteries on the north side of the Rock of course bore the brunt. Our navy having command of the sea, reinforcements for the garrison kept on arriving up to the end of April, bringing up the British garrison to over 6,000.

On 9 and 10 March we read of guns being disabled in *Britain's* battery ;[1] Our guns seem to have kept on bursting, possibly the result of overfeeding a debilitated interior ! On April 21, Lieut.-Col. Jonas Watson, a grand old man of the R.A. (K.2), arrived in the ship which brought out the Governor, and with him a welcome reinforcement of gunners, guns and stores. Several noble lords arrived as volunteers in the same vessel, evidently to see the fun.[2] On May 3, *Britain's* battery was so badly damaged that it had to be dismantled and reconstructed. On May 15 we read that the enemy fired from 31 guns. The defenders had "in all, to the front, 30 pieces of cannon and 7 at Willis's, and on the 17th they had 14 guns mounted on the Old Mole and 10 on the Grand Battery." The enemy were losing heavily in men in various ways, including desertion.

On May 30 the new *Britain's* battery was re-armed with guns from the New Mole, and by June 8 was completed with 6 guns. On June 12 hostilities ceased and on the 13th the siege was raised. The British casualties were very light, viz. 154 deaths and 207 wounded of which the share of the R.A. was 10 and 16 respectively, but included the gallant Captain-Lieut. Holman (K. 8) killed in the Royal battery.

According to the list of the armament attached to the above journal dated "Gibraltar, 28 May, 1727," of the "Mortars we fired from" and "Cannon we had in the North Battys., Gibraltar," there were at the time of that siege only 57 mortars altogether on "The Rock" and 53 guns on the North Batteries. This points to the

[1] I am unable to identify this. It must I think have been well advanced some where above the present "Casemate Square."

[2] A procedure not altogether unknown in later centuries! J.C.D.

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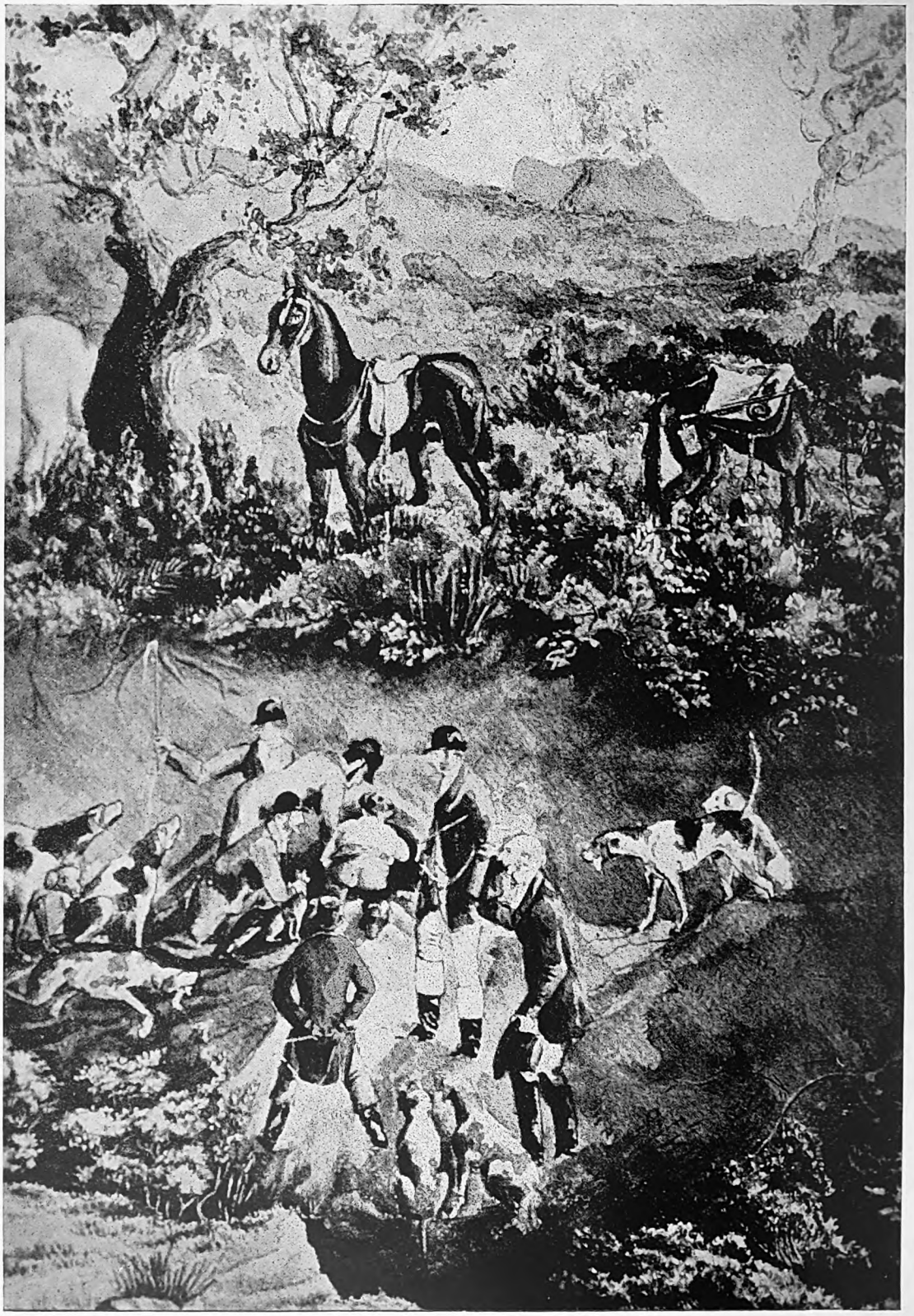

THE CALPE HUNT. No. 1.

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[See p, 339.

fact that there was little, if any, increase in the armament since Horneck's list was made, 7 years earlier. It is not therefore surprising that when it came to firing with service charges in 1727 most of the "cannon" turned out to be *stumers*!

The present C.R.A. Gibraltar, Col. J. D. Sherer, has given me an interesting piece of information, viz. that his great-great grandfather's brother, William Sherer, was in Gibraltar during the siege of 1727—not as a professional soldier, but believed to be in the same line of business as Samuel Pepys. The family has his will "in which he expresses a belief that he will not escape alive, and in this he was right. He died all right, but there is no trace of his tomb. There is a memorial to him in Chichester cathedral; he was quite young." [1]

III. Recreative.

Calpe Hunt Kennels.

When I took over Hon. Secretary and Treasurer in 1883 these were attached to the cemetery enclosure on the west side and very poor and insanitary. The huntsman's quarters looked out on to the cemetery, and when Will Conolly, the huntsman (1882-93), had the misfortune to lose his wife in that year it can easily be imagined that this outlook was almost more than he could bear. However, thanks to H.E. Sir John Adye, R.A., and Col. Ravenhill, C.R.A., Lieut.-Col. Burgmann, R.A., M.F.H., had the satisfaction of moving it in 1884 to the present comfortable kennels near the Devil's Tower, as a tablet on the Huntsman's quarters relates. The architect was Lieut. W. B. Askwith, R.E., eldest son of General W. H. Askwith, R.A.; He was, alas! blown up by an accidental explosion February 27, 1885, in the fighting round Suakin.

When the old kennels were cleared away there was found in the filthy manure heap near the entrance a quantity of tobacco done up in huge bales *(bultos)* which had been evidently concealed there by Spanish smugglers, awaiting their opportunity on some dark night to run it into Spain across the frontier. Whether the aroma of the fragrant weed improved or otherwise by its savoury setting would be a matter of taste! Each of these bales was one man's load. There were several marble slabs bearing inscriptions

[1] Extract from a letter to myself from Col. Sherer, dated 22.9.24. J.C.D.

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in the old kennels which were transferred to the new. One was to the effect that *Richard Holmes* was the architect of the old buildings. This fine old sportsman and life-long supporter of the hunt came to Gibraltar first about the time of the Crimean war, helping to look after mules and horses for the seat of war, and returned after a while and took up his abode on the "Rock," becoming eventually the manager of the gas works. He had a fine power of forcible language in either English or Spanish, as the case demanded, and both with a strong Irish brogue. He was marvellously capable and versatile and I have a photo he gave me of himself in full hunting costume, together with horse appointments, spurs, etc., *every item* of which he had made himself. His "top" boots, I remember, were really brown butcher boots with the upper part of the leg left brown and the rest blacked! He was drowned out hunting on 6 April, 1888, at the age of 76, when rashly trying to cross a swollen river on the eastern beach side of "Washerwoman's Ford" (now called Holmes' crossing), where a monument was erected to his memory. It was close to this, on 22nd January, 1887, that I witnessed the accident to Col. Gilbard out hunting to which he succumbed soon after. In December, 1864, there was a shocking accident to a party of officers when returning in a "jaunting car" [1] from an excursion by the western beach. They had to cross the river at Orange Grove which was in heavy flood: two officers of the 9th and one of the 15th Regiment as well as the driver lost their lives, the only survivor being Captain Hopkinson of the 15th. As may be imagined this cast a gloom for many a long day over the Gibraltar community.

Old Race Course.

In 1870 the race course was round the cemetery and I was present when a poor gunner of the 15th Brigade in his eagerness to see the finish of a race, got too far forward by over-straining the rope that was stretched to keep back the crowd, and was instantly killed by the horse ridden by Lieut. Hallam Parr (the late General Sir Hallam Parr), 13th P.A.L.I. Great sympathy was shown when all the R.A. and most of the garrison attended the funeral, including poor Parr who was deeply distressed, though he could not possibly have been

[1] Curiously enough, in my young days, the "Irish Cars," both open and covered, were the only hackney carriages used on the Rock.

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to blame. This strange site for a race course was soon after changed to its present admirable position.

Art Exhibitions.

During the happy government of General Sir John Adye, 1883-6, who was an artist of no slight merit, we had more than one exhibition of original paintings and sketches as well as a certain number of good pictures lent by various owners. Sir John was a prolific artist and possessed a bold and effective style which especially lent itself to studies of the Rock and country round. Another well-known artist of the same date was Captain S. Buckle, R.E., the Colonial Engineer. Many of his charming works are still no doubt to be found on the Rock; he never had any trouble in selling his pictures. In the R.A. we had a clever artist who worked on a more ambitious scale, and in oils, viz. Major the Hon. F. Shore (later Lord Teignmouth), who had exhibited in the Royal Academy and other good galleries, and gained prizes, I believe, in Simla. He was quite a character and went by the name of "Jane" Shore amongst his intimates.[1] There was, however, a very worthy but rather irrepressible junior officer—not of the R.A.—on the staff, whose familiar style Shore rather resented, though they were quite good friends. One day when he addressed our major as "Shore," the latter thought it high time to correct this unintentional want of respect, and said to him "Look here, C——, though I don't mind senior captains calling me 'Shore,' I expect junior officers to say 'Major.' " All the answer he got was "Thanks, *Jane*, for the 'int." The fellow was incorrigible, and Shore often laughingly told the story as a good joke!

Music.

Another very useful society which contributed largely to the pleasure of all who were fond of music, was started in 1886 under the patronage of H.R.H. the Duke of Edinburgh and was allowed the title of the "Royal Minnesingers' Society." It was composed of members drawn from both the civil and the military inhabitants. The first hon. secy. was Surgeon Major Thomsett, a talented musician, and he was, I believe, succeeded by Lieut-Col. Whaite, R.A.M.C. The Chief Justice, Sir H. Burford Hancock, the late

[1] Another nickname being "The Honble. Damnable"!

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Mr. H. P. Mosley, whose marked musical powers, instrumental and vocal, proved a tower of strength, together with many others of the staff, garrison and civilians, took an active part, greatly aided by the bandmasters of the regiments. Part songs, cantatas and oratorios were practised and rendered at delightful smoking concerts (confined to the sterner sex), and "musical soirées" to which ladies were invited, were held in the Public Assembly Rooms. The present president is the Hon. A. Mosley, C.M.G. Since those days a Gibraltar Choral Society has, in addition to the above, been started (1908) under influential patronage and still flourishes.

A delightful personality in the world of music of my period of service as D.A.A.G. (1883-7) was Signor Labocetta, one of the most talented and artistic musicians, alas! taken from us in the prime of his powers. He conducted our amateurish efforts at oratorio with much patience and energy, and his somewhat "broken English" gave a piquancy to his remarks and softened the apparent ferocity of his attacks on certain delinquents whose false or wrongly accentuated notes were instantly spotted by his extraordinarily accurate ear. We had the advantage of a well-trained military orchestra and were ambitious enough later to undertake the "Messiah" in the Cathedral, but our first efforts were with Farmer's simple but very effective oratorio "Christ and His Soldiers." Labocetta coached us for that in the South Barrack Garrison Chapel.

The ladies occupied one side of the aisle and the gentlemen the other, and each set of voices went through their parts in turn. At one point in a chorus the ladies had to confess in a plaintive voice "We all like sheep have gone astray," to which the men responded in stentorian tones to the effect that they also had "strayed from wisdom's way," ! which brought to one's mind the old story of a hymn sung in an old fashioned conventicle where the women and men sang separately, the fair members leading off with "Oh ! for a man-, Oh ! for a man-, Oh ! for a mansion in the skies," to which the men added their petition, "Send down Sal-, send down Sal-, send down Salvation from the skies !"

Ambulance Classes.

In 1883 I took up the duties of hon. sec. to the Gibraltar centre of the St. John Ambulance Association, which had only recently

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been formed. With the kind and gratuitous help, as lecturers, of the medical officers, civil and military we succeeded in passing successfully a large number of the inhabitants of both sexes and also of the troops for their first-aid and home-nursing certificates.

On one occasion we had for lecturer to a class composed of officers of both services a very enthusiastic young army surgeon, and amongst the class was a distinguished naval officer covered with decorations earned in hard fighting. The lecturer was dealing with the circulation of the blood and produced some very sanguinary looking diagrams including a human figure life-size minus his skin, and coloured to show arteries and veins. This proved too much for the naval officer who went off in a swoon and had to be taken into the open air and restored. No doubt the stuffiness of the atmosphere precipitated matters. The same lecturer went a bit better in a subsequent lecture to a class of "Tommies" for he had, unknown to me, induced a young soldier to allow his practically nude body to be decorated with coloured chalks to shew the position and course of the blood vessels. This was a bit too thick, and with any other audience than the British soldier, who thought it a fine joke, it might have easily effected a "general post" !

In May, 1870, two Gibraltar civilians named Bonell, uncle and nephew, whom I well remember as taking daily afternoon rides into Spain, were set upon by a band of five brigands (*ladrones*) at the *ventorillo* of Zabal on the eastern beach and carried off to the mountains. With great difficulty the Governor, Sir R. Airey, got into communication with the leader of the gang, and by finding a considerable sum (over £5,000), which he paid out of the treasury chest, got them released, more frightened than hurt. The band was, later on, fully accounted for by the Spanish Guardia Civil, all but one man, who escaped in the dark by the skin of his teeth, abandoning all his share of the booty, horses and arms.

The Governor attended by his A.D.C's happened to be returning from a riding excursion in Spain on the day of the capture and stopped for a few moments at the very ventorillo in which the captives were lodged under lock and key, their captors having gone away temporarily, doubtless to make further arrangements. Thus it could easily have happened that the brigands might have

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made the great coup of capturing the Governor of Gibraltar as well! Spain was in a very unsettled state at that time, there being a "Gobierno provisional" under the Presidency of General Prim, but he paid back to the British Government the ransom money. It was not an uncommon occurrence for officers to be attacked by drunken Spaniards when returning from hunting or riding into Spain.

Communications.[1]

Within the last quarter century the facilities for entering Spain and *vice versâ* have largely developed. In the early eighties I remember a considerable sum being raised for the purpose of improving the road to Campamento and on to San Roque, in conjunction with the Spanish authorities. I fear, however, that the money was not wisely spent. Anyhow there is now quite a decent road to Campamento, the lungs of Gibraltar, where golf links, polo ground and a race course give great opportunities for recreation. Motor cars and motor buses can now pass freely from Gib. on to the chief roads into Andalucia. Algeciras is half an hour's drive, and Malaga 3 hours, etc. The Rock has now been brought more than ever into the world and easily accessible to travellers by land as well as by sea.

[1] The "Gibraltar Directory" now, thanks to the enterprise of its editor, Mr. B. Miles, possesses an excellent road map of the south of Spain, with distances plainly marked.

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THE CALPE HUNT. No. 2.

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Two Water Colour Paintings of the "Calpe Hunt," Gibraltar,

BY MAJOR CHARLES W. D. STAVELEY, 44TH REGT. DATE 1852-1853.

THE above have kindly been lent for reproduction by Brig.-General William C. Staveley, C.B., R.A., son of the artist. The photographic reductions have been done by Walter Davey and Son, 26 James Street, Harrogate.

No. 1.—size $13\frac{5}{8}''$ × $20\frac{1}{8}''$—"Gone to ground" in the Cork woods after a fast gallop; the "Rock" in the distance. The figures are portraits, and reading generally from left to right, are as follows:—

(1) The Whip, *Lieut. R. H. Clarke, 26th Regt.*, keeping back the hounds who shew signs of a fast run on a warm day.
(2) The Huntsman *Johnny Irwin* (1850-7), bending over the Earth.
(3) The Hon. Sec. and acting M.F.H., *Capt. H. T. Phillpotts, R.A.* In hunting costume holding a terrier.
(4) The Spanish Earthstopper *Sebastian* (stern view), whose typical pony, ridden to a standstill is seen above, on right.
(5) *Capt. Carey, 26th Regt.* standing facing the Earth, in tall hat.
(6) *Capt. Frend, 26th Regt.*, side face, in pink, looking towards the Earth.
(7) *Colonel W. Cator, C.R.A.*, M.F.H. (1850-2), below No.6. In mufti, mopping his head.

N.B.—The date of this picture is probably end of March or early in April, as Col. Cator had been for some time under orders for England and left Gibraltar on April 14, 1852. He had, it is assumed, resigned the Mastership because Capt, Phillpotts, R.A., is noted in the list of names (which are in MS. on the mount, and had to be omitted for want of room) as acting Master. A short record of the artist is included in the letterpress.

No. 2.—size $10\frac{3}{8}''$ × $14\frac{1}{2}''$—"Foxhunting, Eastern Beach, Gibraltar, 1853." The scene of this is probably somewhere near the Millstone Ravine; a characteristic, if slightly exaggerated, scene. There are no names, but doubtless the main figures are portraits.

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IV. Governors, C.R.A's, etc.

Probably one of the most enlightened governors of Gibraltar, as well as one of the most distinguished, was General Sir Robert W. Gardiner, G.C.B., K.C.H., R.A.,[1] whose war services are detailed in "Kane's List" (1899), p. 240. Suffice it here to say that they included a year in Gibraltar, 1797-8—France and Spain having declared war on England in 1796—capture of Minorca, 1798; Sicily; with Sir A. Wellesley in Portugal; with Moore in retreat to Coruña; home in time to go to Walcheren, etc. in 1809; then through all the chief actions of the Peninsular War, finishing up with Waterloo. From 1816 to 1841 he was employed about the Court. He had a decided literary ability and was a keen student of his profession and wrote a book on cavalry with artillery. After giving up the governorship of Gibraltar he "respectfully addressed" in 1856 a long "Report on Gibraltar considered as a Fortress and a Colony" to Viscount Palmerston, then Prime Minister. The report is most exhaustive, and interesting reading and includes an appendix dated 1850 on defence, and on government and trade questions, but there is much that civilians of a later generation could not agree with. He animadverts largely on the everlasting question of contraband which evidently was a constant source of anxiety and irritation to a man of his lofty sense of honour and conscientiousness. It was not therefore to be wondered at that, as we read in the chronicle of events in the Gibraltar Directory of 1918, " during his tenure of office there was marked friction between the government and the merchants which gave rise to a deputation being sent to England to lay before the crown the hardships of the people of Gibraltar."

R.A. Mess, North.

The latest addition to the names on the "Dalton" Cup for this year as being the first gunner officer in the point-to-point race is that of Captain L. C. Towers, R.A. There had not been a race since 1914.

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[1] A very nice photograph of him from a picture or miniature, in full uniform, in the year 1820 (approx.) appears in Lieut.-Col. Leslie's paper in the R.A. Journal for October, 1924, on the R.A. Officers in the Peninsular War.

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Mess customs of half a century ago.

These have changed no doubt in somewhat similar proportion to those of a century since. We remember reading of the "two" and even "three-bottle men" of the first half of the 19th century and of the small notice taken of heavy drinking, broils, braggadocio, hard swearing, etc., often ending in duels, frequent courts-martial and cashiering, all probably due to strong potations. Well, even my recollections of half a century back bring to my mind regrettable customs which though distinctly much milder than those I have indicated above and not so disastrous in their results, one looks back on and rejoices to have seen gradually modified and now practically wiped out. When I joined at Gib. in January, 1870, as a youth of one year's service, I joined a mess containing as fine a lot of officers as one could ever wish to be associated with, but though well-managed, there was still in vogue a system of "sherry and bitters" before mess, starting any time after four p.m. and continuing till the "dress" was sounded. This "appetiser" was by no means confined to one glass, detrimental both to health and pocket, and rather defeating the object for which it was taken, tending sometimes to obfuscation ! There was no such thing as "afternoon tea" then, and the bare idea would have been scouted—in fact the only officer who used to indulge in that way (at ladies' tea parties) went by the name of "the curate" ! But Gibraltar unfortunately did lend itself towards favouring the "sherry and bitters" for we got an excellent cheap Manzanilla sherry and a splendid brown sherry from Jerez, called *Romano* and known as *Stingo*. "The curate," however certainly flourished on his tea and rose to considerable distinction. I found a marked change in the customs in 1883 and onwards and still greater in 1905. After a hard day's hunting we all flew to tea and buttered toast with probably a poached egg or two, and after a pipe and a rest, a child might play with one and we were ready and fresh for dinner and to fight our battles over our well-earned glass of "strong military ditto" (port). !

Connaught House.

I notice that this commodious building in Commercial Square, is now being taken for offices to accommodate the Executive Council, etc. I can remember it in the year 1870, when it was the

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Club House Hotel (of which I have a photograph as such), and there being then no club in Gibraltar at that time available for meetings, etc., it was a favourite resort for the officers of the garrison. When H.R.H. the Duke of Connaught came to Gibraltar in October, 1875, as a staff officer, he occupied for six months this house, then the property of P. Larios, Esq., who placed it at his disposal, and it was then called after him.

V. Miscellaneous.

Two stories concerning our American cousins come to my mind. My father, who was presiding at the R.A. mess on the occasion of a dinner given to the officers of an American warship in the early sixties, related to me how the conversation turned onto a recent incident on the western beach where a British officer out riding and returning home for gunfire was molested by some drunken Spaniards one of whom struck his horse. Had he retaliated he would have been overpowered by the natives, of whom there were many returning home from their work, and would have had to spend his night in an unsavoury guard house at La Linea and much trouble and annoyance would have been caused, so he had to swallow the affront. But this procedure did not satisfy the Yankee who said "Sir, if that had happened to me I should have torn that man limb from limb." These incidents, though happily rare, had to be treated with great tact and care, for the population of La Linea was an unruly one. On their own ground the natives were very different to what they were when they came into the fortress, where great numbers are employed daily on tickets.

I have often wondered at the small number of disagreeable incidents such as this one, because we have to remember that the western beach was practically the high road into Spain, and even is still, for pedestrians and horsemen when the tide is out and the sand hard. It was not to be wondered at that occasionally when an injudicious and thoughtless rider would gallop past the pedestrians without warning and too near to be pleasant, that these resented it.

Another amusing story with reference to a visit of an American squadron to Malta was told me by my friend the late Capt. W. G. White, R.N. He had become very friendly with the Flag Lieut.

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of a certain well-known and distinguished Admiral of that nation, then in harbour, who was notorious for his forcible language which he evidently found difficulty in restraining. On one particular occasion of an important dinner on shore at the Palace, White, who was not present, meeting his friend the "Flag" next day in the club asked him how the dinner party went off, and the answer was "Wal, Sir, I guess my borss was just fine, there was not one single *Gordam* from hordoovers to peanuts" !

Just before I left Gibraltar I received as editor of the *Gibraltar Chronicle* the first message over the cable, on 4th February, 1887, congratulating the colony on the establishment of telegraphic communication between Gibraltar and Tangier, by the E.T. Company, and have kept it as an interesting relic.

Early in 1886 the Mediterranean Fleet was in harbour under command of H.R.H. the Duke of Edinburgh, who gave an excellent concert on his flagship the *Minotaur* and took part in a very successful "toy symphony." As editor of the *Chronicle* I had to write a report, and next day being a hunting day when my duties as secretary demanded my presence in the hunting field, I fear my correction of the proof-sheets was inefficiently performed, for when I returned home in the evening and read my *Chronicle* I found that I had said that "H.R.H's toy symphony was received with rupturous applause." I got a message from H.R.H. that evening to thank me for my report of his entertainment but regretting the apparently disastrous effect of his toy symphony !

I have already in Part I alluded to the fact of Zebehr Pasha being interned in the governor's cottage at Europa in March, 1885, as a political prisoner, but I did not mention that he applied to have his private secretary to join him which request was acceded to on certain conditions. When the secretary arrived (a scowling and most uninviting-looking native) the Governor deputed the Chief of Police, Mr. Seed, and myself to search him and his luggage carefully and see that he brought nothing in the way of papers or correspondence with him. We had accordingly the unpleasant task of stripping him and searching him, and when garment after garment came off including his turban and we had got him down practically to his buff, we found him hung round with amulets and charms of sorts ! We felt

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that this was the limit and accordingly passed him; but I have often wondered whether those amulets might not have contained treasonable matter! I often saw him after that and he seemed to bear me no malice, which might be construed in the sense that he had scored off us!

I feel guilty at running on with such *persiflage* and must spare my readers any further infliction, thanking them "in anticipation" for their patience if they have got as far as this, and once again apologizing for the constant use of the first person, but for the life of me I do not know how to avoid it.

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SNOW CAMPAIGNS.

By Major-General Sir W. E. Ironside, K.C.B., C.M.G., D.S.O.

TO those who have never experienced the rigours of a wind-swept plateau in the East, Persia most probably raises a vision of beautiful rose-gardens, and cool rippling streams. To talk of hardships amidst snow and ice must seem to them incredible, and yet, the conditions of the Winter Campaign in North Persia were in many ways more severe than those of North Russia. Like the Russian Campaign, that of North Persia was an aftermath of the Great War, and being carried out some two years later, the troops taking part were perhaps more tired and home-sick than those of 1918-19. Several of the Indian Regiments engaged had left India for France in 1914 and had drifted back eastwards via the Dardanelles, Egypt and Mesopotamia to North Persia. The marvellous thing was that they bore the severe conditions so patiently. The same hazy ideas as to the why and wherefore of the campaign prevailed amongst the rank and file. The same perplexing medley of ineffective enemies, allies and neutrals passed across the scene—Red and White Russian, Pro-Government and Rebel Persians, Swedes, Kurds and Assyrians. The North Persian Force itself was subordinated militarily to the Commander-in-Chief in Mesopotamia and diplomatically to the British Minister in Teheran. Whilst affairs in Persia were directed by the Foreign Office, those in Mesopotamia were in charge of the Colonial Office. Truly, a pretty setting for complications of all sorts.

In the year 1908, the Anglo-Russian Agreement had done much to regulate the difficulties outstanding between the two great Empires. Persia became divided thereby into two spheres of influence, the northern going to Russia and the southern to Great Britain. By 1914, Russia had established a complete economic and military ascendancy in her sphere, the officers of the only force of regular troops in Persia, the Persian Cossacks, being appointed by the Czar from amongst officers of the Imperial Russian

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Army. With the outbreak of hostilities in 1914, Persia, though protesting her neutrality, was forced to become an active theatre of war. Turkish and German agents succeeded in suborning the Persian armed Gendarmerie under their Swedish officers and a conflict took place between the Persian Cossacks and a rabble of Swedes, Germans, escaped Austrian prisoners and Persian Gendarmerie. The northern sphere was finally cleared by the landing of a Russian Force at Enzeli on the Caspian and by the Russian occupation of Kazvin. The Gendarmerie then turned their attention to the southern sphere, their operations being countered by the British occupation of Bushire. Then came the campaign in Mesopotamia, but it was only with the occupation of Baghdad that British and Russian forces finally effected a junction in Persia. This junction was, however, not to last for long. The Revolution of 1917 put an end to all Russian operations in Persia. General Baratoff's force withdrew northwards in great disorder, looting and plundering as it went in true revolutionary style, gaining the Caucasus by land and sea route from Kazvin and Enzeli.

The British forces then extended northwards, in order to prevent general chaos in these disturbed regions, and after the armistice of 1918, they were to be found from Batum to Baku in the Caucasus and far eastwards along the Trans-Caspian railway. The commands of the Commanders-in-Chief in Mesopotamia and the Black Sea met in Trans-Caucasia. Such extended sway could not long be maintained, and as each mandate in these debatable regions was refused in turn by those to whom it was offered, the British forces relaxed their hold. The Army of the Black Sea withdrew westwards, retaining Batum for a short time, whilst the Army of Mesopotamia held North Persia only. During the long struggle between Whites and Reds in South Russia, a White Russian Fleet held command of the Caspian Sea, but with the collapse of Denikin, this fleet lost the Russian ports upon which it was based and was forced to intern itself at Enzeli in Persian territory. During the summer of 1920, British Forces were occupying both Resht and Enzeli. Profound quiet reigned and the troops had much of their peace-time equipment with them. Sea-bathing, free issues of fresh caviare and later the finest woodcock shooting imaginable did much to mitigate their isolated position. Out of the mist of the Caspian Sea, however,

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there appeared one morning a Bolshevik shell discharged from a Bolshevik ship. The situation was uncommonly difficult. We were not at war with the Soviet Government and we were in a neutral country. In the end the British troops withdrew. The Bolsheviks seized the abandoned White fleet and commenced to follow our troops as they withdrew southwards up the Menjil Pass. The Persian Cossacks under their White Russian Officers, under orders from Teheran, pressed forward through the British troops to oppose the Bolsheviks, recapturing Resht, but failing to reach Enzeli on account of the fire of the Bolshevik gunboats.

This withdrawal of the British troops without fighting made their situation in North Persia more invidious that ever. The Persians very naturally enquired what we were doing in Persia if we did not intend to defend them against an invader. The remarks of the Persian Cossacks as they passed through to the front were by no means nice to hear.

The Persian is, however, not a persistent fighter and the rain and malaria of Resht soon brought about a collapse of the Cossacks. They retired up the Menjil Pass in disorder and in October, 1920, the British found themselves once more in touch with the Bolsheviks. These latter, coming on in hot pursuit of the Persians ran into the British unawares and suffered heavy casualties. A vigorous offensive then drove them back to Resht and the southern end of the Menjil Pass was occupied. The Persian Cossacks were then ordered to collect in the villages to the West of Kazvin and were gradually brought into some sort of order.

Such was the state of affairs when definite orders were received to prepare for another winter occupation of North Persia.

Although British troops had spent the two previous winters in North Persia, little could be laid down with certainty. There was no hard and fast coming and going of the winter as there had been in North Russia. Both winters had been comparatively mild, and there had been few operations against any enemy. Upon one fact all were agreed—the wind in winter cut like a whip and cover for troops at night was essential. No preparations had been made in the way of special clothing, rations or transport, and it was intended to place complete reliance upon mechanical transport—Ford box-cars and light lorries—for all services except that of the first-line

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with troops. Winter conditions might be expected in November and would probably last till March. Such was roughly the sum total of the information available

Three questions had to be decided at once :—

(i) What was to become of the Persian Cossacks?

(ii) What was to be the winter position of the column opposing the Bolshevik invaders?

(iii) How was the Line of Communication to be maintained?

As has been explained, the Persian Cossacks were officered by White Russian officers. These latter openly declared that they regarded themselves as keeping the North Persian sphere of influence in bond for a future Czarist Government. This attitude was, of course, well known to the Soviet Government, which accused the Persian and British Governments of harbouring White Russians in a position from which they could menace peace in Soviet territory. The funds with which the Persian Cossacks were being maintained were at the moment coming from British sources, but evidence was not wanting that substantial sums were being diverted into the pockets of the Russian officers. Although the military value of the Cossacks had sunk very low, Teheran had no wish to see such a rabble creating trouble in the capital, so it was decided to relieve the political atmosphere by dismissing the White Russian officers. The order for the dismissal was signed at Teheran by the Shah and communicated to the Cossacks by telegraph. Colonel Starosselsky, the Commander of the Cossacks, did not, however, take his dismissal lying down. He at once jumped into his car, passed through Kazvin and reached Teheran within 12 hours of his dismissal. He obtained an interview with the Shah, but no satisfaction, and at once commenced to issue orders for the concentration of the Cossacks to the East of Kazvin in positions free of interference from the British. As all the telephone and telegraph wires ran through the British Headquarters it was easy to ensure that the Cossacks were concentrated close up to Kazvin and to the west of it, well under observation, instead of in Starosselsky's positions. Only one party of some 400 with 4 mountain guns managed to slip past by entering the foothills to the north of the town, and these were viewed and persuaded to return by the Cavalry and armoured

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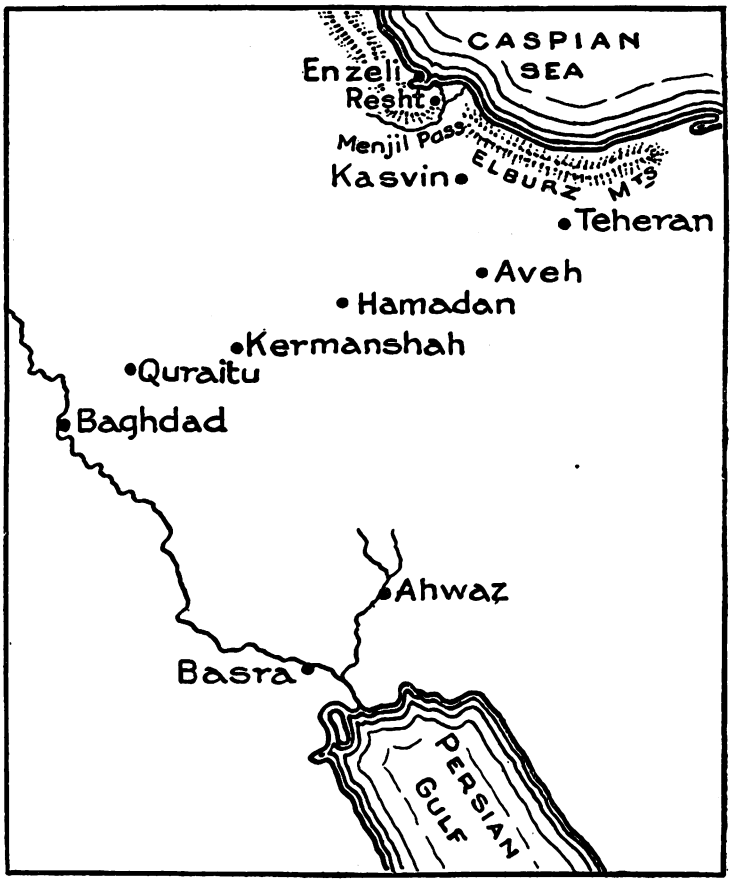
cars. Starosselsky, returning to meet his troops was also persuaded to come into Kazvin, from Teheran, accepting the situation with true Russian sang-froid. The officers were all packed off to Baghdad by cart within a month and the Cossacks were taken over by Persian officers only. In conversation with one of the junior Russian officers I was naively asked whether the British Government would give pensions to those who had not had the opportunity of enriching themselves as the senior officers had done. An inspection of these Cossacks shortly after the departure of the Russians revealed a wretched state of affairs. The men were without boots and under-clothing, their pay was in arrears and no effort had been made to prepare even a modicum of winter clothing for the coming cold weather. The departure of the Russian officers was regarded as a blessing by all ranks.



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After their losses in the collision with the British troops in the Menjil Pass, the Bolsheviks had remained quiescent, but intercepted wireless messages soon showed that they had no intention of withdrawing from Persia, now that they had seized the White Fleet. Telegrams from Moscow were urging the Bolshevik leaders to take the offensive and patrol activity was everywhere in evidence. The formation of a Persian Red Army, consisting of rebel Persians under Bolshevik officers, was also commenced with a view to overturning the Shah and establishing a Red Soviet in Persia.

The main physical feature in North Persia is the great range of the Elburz Mountains, rising to a general height of 11,000 feet and skirting the southern shore of the Caspian Sea. This range is pierced by one pass, the Menjil, along which the river of the same name and the excellent Russian motor-road from Kazvin to Resht run. On the northern slopes almost up to the summit there is dense forest, whereas the southern slopes are practically without vegetation of any kind. The northern slopes catch all the moisture from the Caspian and the forest is always dripping wet and malaria universal. There is also a dip in the country at the southern end of the pass where malaria is prevalent. A British Regiment had been left too long in this area during the late summer and had become infected up to 90% of its strength, having to be withdrawn to Kazvin and nursed for the rest of the campaign. With the Bolsheviks in possession of the only ships in the Caspian, it was useless to think of going back to Enzeli, merely to be shelled from the sea and so, with the lesson of the malaria fresh in mind, it was decided to leave the Bolsheviks to stew in the low ground and to hold positions on the northern slopes of the range as close up to the snowline as possible. The Menjil Column, consisting of 2 Bns. 4 guns, 8 armoured cars and a troop of Cavalry, accordingly ensconced itself high up in the Menjil Pass and prepared to remain there for the winter. All necessary stores and supplies to last until March were concentrated with the force in case the road to Kazvin was interrupted, the only troops remaining between the area occupied by the column and Kazvin being a platoon of infantry in a fortified house overlooking the iron bridge over the Menjil. Active patrolling and raiding were begun at once and continued throughout the winter, with such good effect that the

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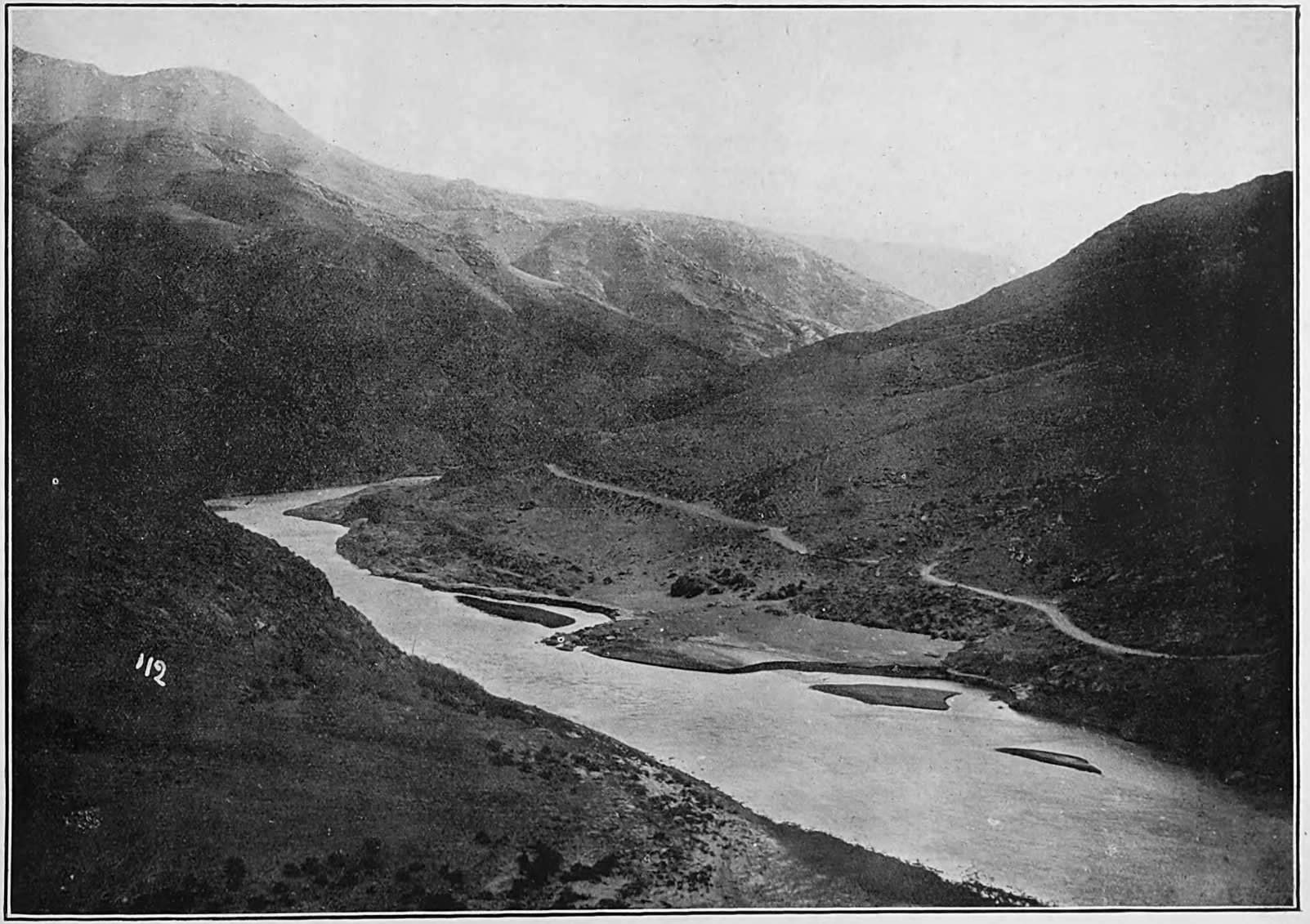

THE MENJIL PASS. (Russian made road.)

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Bolsheviks withdrew to behind log breast-works near Resht, from which they seldom emerged. At first there were many rumours of Persian rebel activity over the footpaths on either flank of the pass, but these were soon disproved by visiting the tracks and searching the snow for any traces of the enemy. Had snow-shoes and light sledges been available, patrolling above the snow-line would have been much easier and the exercising of the men more interesting. News from intercepted messages showed that the Russians were rapidly disintegrating from sickness and that they were falling out with their Persian allies. Many were the telegrams to Moscow complaining of the apathy and non-revolutionary spirit shown by the Gilanis, and any active offensive against us was clearly out of the question.

The health of the Menjil Column remained excellent throughout the winter. They had the excitement of occasional fighting with the enemy and a good deal of sport including wild pig. As an actual fact, the road from Kazvin was closed owing to snow on two occasions for a week at a time and on isolated occasions for a few days besides. Clearing snow was not nearly so heavy as on the Line of Communications and no difficulty was found in procuring Persian coolies for this work. To have instituted sleigh transport on a large scale would have been uneconomical, but a certain number of horse-sleighs and Kégresse motors, with skis in front instead of wheels, would have been of great value for liaison and post duties. The value of liaison was brought home to all in the Great War. The human touch of a personal talk cannot be overestimated in value. Moral is undoubtedly raised by the free circulation of Commanders and Superior Staffs. Both in the air and on the ground quick and efficient means of transport must be arranged to suit the special conditions of each campaign. Riding in an open aeroplane is not conducive to clear thinking and accurate work when the distances to be traversed are great.

The question of the Line of Communications was a difficult one to solve. Meat and flour could be obtained locally and sufficient ammunition and clothing had been concentrated at Kazvin. The amounts of stores which therefore had to be brought up during the winter was small. But a Line of Communications is something more than a mere route by which food and ammunition is forwarded.

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It is the link which binds the Army to its base and to the homeland. There is nothing so detrimental to moral as a feeling of isolation. A steady flow of letters and parcels is ocular proof that isolation is not complete and will go further towards cheering up the rank and file than even the loud speaker issuing the football results, which may be expected in future small wars. Again the soldier delights in his small luxuries, such as cigarettes and chocolates and an occasional bottle of beer. But, even against an enemy of low military value, one can never be sure of what is going to happen. The motor road from the Persian railhead, down in the plain at Quraitu, to Kazvin was 400 miles in length. The road crossed two great passes, the Asadabad and the Aveh, at heights of 6000 and 9000 feet respectively. The maintenance of this road at all times was great, but with snow it might be expected to be enormous. Was it worth while leaving the road closed as soon as the snow made things impossible and treating the North Persian Force as an isolated column? This question was given much consideration from every point of view and it was eventually decided to maintain the road at all costs during the winter. Pack-transport could at all times have been used, but the 400 miles took at least 6 weeks for this style of transport and in snow considerably more, and would have been of little use in an emergency. The force would eventually have to evacuate Persia or a larger force might come up in Spring. Deterioration through snow and denudation with the advent of thaw was sure to be big and it might be necessary to reconstruct the motor road. The snow-clearing proved to be very heavy indeed and the cost excessive. The road was never actually free from end to end during the winter, and the motor transport worked in cleared islands so to speak. The wind blew up the cleared areas in a few hours after days of clearing had made them passable. The best transport, as is nearly always the case, was local, in this case the three-horsed Persian cart, and with these it was possible to replace the mechanical transport for the small services required. Although a telephone line existed throughout the length of the Line of Communications it would have been of inestimable value to have a sleigh fitted with an aeroplane propeller or a Kégresse with skis, for it is the frequent visiting of isolated posts which ensures their efficiency. The Persians were apt to turn in from their clearing unless carefully watched, and white overseers were difficult to find. When the final thaw arrived, the washaways

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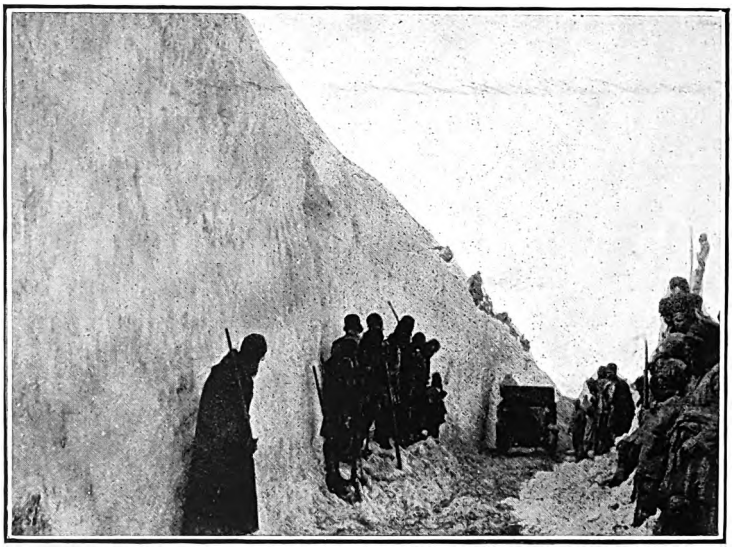

FIAT IN A DRIFT.

ROCK SLIDES.

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were numerous and rockfalls at important points most dangerous. Had the work of clearing not continued throughout the winter our difficulties would have been much increased.

A flight of the R.A.F. was maintained at Kazvin throughout the winter and proved of inestimable value. The aerodrome at Kazvin was made passable by moving up and down fleets of Ford cars and lines of horses, the most efficient clearer, however, being the camel. The temperature at the aerodrome frequently fell below 32 degrees of frost and landing and starting were further complicated by the fact that on certain days the sun melted the surface snow into slush at midday. As the planes starting from Kazvin were to land upon clear ground when once the plateau of Persia was left behind, it was impossible to fit them with skis.

Improvisation of winter material is almost impossible in such a country as North Persia. Wind-proof clothing for campaigning is essential. The jerkins and leg overalls supplied to the mobile troops in North Russia would have been ideal, for they were light and did not impede movement, whilst they kept out any cold that might be expected. Thin khaki drill and even serge are not wind-proof. The Indian troops had less experience of trench warfare than the British and their foot discipline was not so good. When dealing with frost and snow everything must be very loose, including both boots and socks or there will be frost-bite. Coloured glasses for all ranks to prevent snow blindness were also required and were available only in small quantities.

The troops in Kazvin could be kept properly exercised with football and hockey as clearings could always be made, but a proportion of winter sports gear would have still further raised the spirits of all. One Battery actually did procure some gear and enjoyed itself exceedingly.

The final march down to Quraitu from Kazvin took place in April 1921 under considerable difficulty owing to the many washaways caused by the melting snow and the subsidence of the motor road into the soft soil below.

Many of the officers and men of this force reached India almost seven years to a month from the date upon which they had left their homes for a war which no one thought would last more than a matter of a few months. The conduct of the rank and file of the Indian Regiments was beyond praise under these trying circumstances.

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ARTILLERY COMMAND FROM THE AIR

By Colonel H. Rowan-Robinson, c.m.g., d.s.o., *p.s.c.*

IN a recent number of the R.A. Journal a contributor summed up the main artillery lessons culled from the staff ride conducted last April by the Chief of the Imperial General Staff.

From them one comparatively new idea emerged, namely, that the senior Artillery Officer—C.R.A. of a division or corps—should observe and command from an aeroplane.

The matter was probably thrashed out in discussion at the staff ride but no details were given in the article in question. It raises many interesting issues:—

Is the C.R.A. allotted a private aeroplane?
How long does he remain in the air at a time?
What are his means of communication with artillery brigades?
How far do orders given by him from the air take precedence—
(a) of orders issued by higher commanders with perhaps less recent information;
(b) of orders issued as a result of other information received from the air.

The principle was tested on a small scale at some manœuvres held in Northern India last cold weather. Two Brigade groups were engaged, each group containing the equivalent of a brigade of artillery. In the operations there was for each side one day in which the importance of the artillery work loomed specially large. On these days the respective C.R.A's were sent up to command their batteries from the air. Owing to landing grounds being rather distant from the battlefield, neither C.R.A. was able to remain in the air for more than an hour and a half. They were both asked to give their opinions on the value of command from the air. One C.R.A. stated that he would have been much more usefully employed on the ground and the other was also distinctly doubtful that there was anything to gain from the new procedure.

Several distinguished gunners joined in the discussion that took place, at the final manœuvre-conference, on the merits or demerits

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of the system, and the general consensus of opinion was distinctly adverse to it, especially in the present stage of development of aircraft and wireless telephony.

Some had no use for the system at all, arguing :—

That the C.R.A. would not observe nearly so well as a professional airman and might easily make serious mistakes.

That he would become too much divorced from his divisional commander and from liaison and administrative duties.

That undue responsibility would be thrown on the C.R.A's staff.

Others thought that the system might prove sound, provided :—

(a) That a C.R.A. had his own aeroplane, with three seats—one for the pilot, one for the machine gunner, and one for himself.

(b) That wireless telephony air to ground and ground to air had been perfected.

(c) That the aeroplane could remain in the air for at least three hours if required.

(d) That senior artillery officers were given frequent and progressive courses in air observation.

No system has ever sprung fully armed into existence. There is always a long experimental period during which the final object, though known, cannot be immediately attained.

In this case we have at present machines in a high state of development. New records in their performances are made nearly daily. Quite recently, for instance, air endurance has reached eighteen hours and speed two hundred miles per hour. We may thus expect steady advance towards the realisation of requirements. The same progress may be predicted of wireless telephony.

The main point at issue is :—Is it really desirable for a C.R.A. to observe from the air? If the answer be in the affirmative, and the principle be accepted officially, we shall without doubt gradually acquire the necessary technical appliances to put the system into operation.

In its favour it may be said that :—

Every commander wishes to see the other side of the hill. However great his imagination, however perfect his sources of

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information, so long as he remains on the ground the fog of war will still envelop him, the unexpected will constantly happen.

The gunner above all wishes to know the positions of friendly troops. If he can only be sure of that and his communications are good he can almost guarantee the progress of their advance or the safety of their withdrawal. With doubtful eyes, with doubtful means of communication, his chief task may remain unfulfilled.

Artillery support to be of serious value must be continuous. At present no means exist for ensuring this. It is feasible in a war of movement to open predicted fire on a given line and, for a short time, to give effective covering fire to advancing infantry. It is possible sometimes to give a number of well-defined objectives to the infantry and to start a fresh artillery time-table after the capture of each. If everything goes according to plan all may be well. But that seldom happens. Normally success is most unevenly distributed along the line. At one point the concentration of very heavy fire is required to enable the infantry to get forward; at another, progress is easy. Reports, some accurate, others inaccurate, come trickling slowly in. By the time the artillery are dealing with the situation it has changed. This was often the case in trench warfare. It will be far more common in a war of movement. Who can tackle this situation better than an experienced gunner in possession of first-class observation. And what a splendid rôle it is! Is there any other satisfactory solution of this pressing artillery problem?

It may be said that this task can be equally well performed by the R.A.F. observer. But is that the case? Can the ordinary observer hope to convey the correct picture to the mind of the commander? If there is available a gunner officer of considerable experience, is it not well to let him see the picture for himself so that his experience may really count?

It will be of value to the C.R.A. to see the enemy's batteries, to note their positions, numbers, calibres, rates of fire and the extent to which they are stopping our infantry. The battle picture will then be complete for him. Normally, however, he will not interfere in counter-battery work, for that can well be left to the technical experts concerned. He may order, or suggest to the corps C.R.A., certain adjustments, but will not concern himself seriously unless

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enemy artillery fire is clearly holding up the infantry. He has great tasks :—to maintain touch with the infantry; to remove their obstacles; to enable them to move; and to keep on moving. And he is the only person who can fulfil them; for he alone can order the necessary concentrations.

It is a common military fault in a subordinate commander to suppose that his troops, more than any others, require support and reinforcement. Hence there are continual calls for artillery concentration all along the line and it is uncommonly hard for a C.R.A. to discriminate between conflicting requirements. On the ground he has to trust to a number of subordinates of unequal value and all influenced by the parochial view; in the air he obtains a broad view of the situation and can rely on his own military judgment.

The main objections to the system have already been indicated. The C.R.A. as he exists at present will certainly make a poor observer. He must be trained. He must be constantly in the air at all field operations. The pilot should do all the pin-pointing for him to enable him to devote his time to the study of the situation and to the writing of orders. At present it is the custom constantly to send up subalterns of artillery in aeroplanes. This is unnecessary. The subaltern of artillery observes from the ground, not from the air. The flying subaltern (if the R.A.F. permits that term) needs all the practice he can get in peace for his duties in war and his requirements must naturally be considered first. Any further room in aeroplanes that can be made available in future should be devoted to the carriage of officers of field rank who are approaching the period at which they may have to fly as a C.R.A.

It is true that the divisional commander would lose the services of his C.R.A. as an adviser during the battle, but the C.R.A's staff—in full possession of their commander's views—would be available. In any case the main wish of the divisional commander is to win his battle. He will surely be content if the C.R.A. is helping him effectively to attain that object.

The number of casualties among C.R.A's will certainly increase, but they will die better in the execution in the air of a real command than by being bombed at the end of a cut telephone wire. No great disorganisation need ensue if a C.R.A. crashes, for, as soon as he

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ceases to send messages, his staff will resort to normal ground command until a successor can be sent up into the air.

If the principle of air-command be accepted the divisional commander must delegate to the C.R.A. full powers. There must be only one authority controlling the artillery. If dissatisfied with the conduct of the fight or if requiring advice on important matters the divisional commander can, of course, always summon the C.R.A. from the air to divisional H.Q. at very short notice.

It is possible that the corps C.R.A. may wish to interfere in the battle-work of the divisional artillery. This cannot be permitted. It is for the corps C.R.A. to draw up the initial artillery plan and to make all administrative arrangements to further its execution. But, except as regards counter-battery work and the direction of heavy or medium batteries outside the divisional organisation, he should leave the control of the artillery once battle has joined in divisional hands.

To sum up : it may be accepted that the control of artillery in battle cannot be efficiently exercised from the air at the present moment. As, however, such a system appears to offer the only solution to the most urgent of artillery problems, namely, that of continuous support to the other arms in a war of movement, steps should be taken at once to render it a feasible proposition. Aeroplanes of the necessary capacity and air-endurance should be built, the requirements of wireless telephones peculiar to the tasks involved should be studied, commanders should be trained now so that they may be efficient when the system is complete and all the complications involved in the change from ground to air control and the attendant reversion from air to ground control should be carefully examined.

It may be that, in this mechanical age, progress in other directions will forestall the application of this system. It may be that battles of the future will be fought by fleets of gun-tanks directed by aeroplanes. If so, and if we have been pursuing the system under review, we shall have been advancing in the correct direction and shall all the time have been fitting our artillery commanders for the higher responsibilities of fleet commanders.

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THE EVOLUTION OF ARTILLERY IN THE GREAT WAR.

By Bt. Lt.-Col. A. F. Brooke, d.s.o., *p.s.c.*, Royal Artillery.

II. FACTORS AFFECTING THE EVOLUTION OF ARTILLERY.

In the last article we examined the artillery situation as it existed in 1914, and endeavoured to lay a foundation on which to build up our study of the Evolution of Artillery during the War.

Before proceeding with our structure, it is advisable to erect a scaffolding, by studying the general factors which affect the evolution of artillery. We shall then be in a better position to follow the various changes which took place in equipment, organisation and tactics. In addition the process of examining the artillery lessons of the war, and of drawing deductions as to future evolution, will be simplified.

In the first place it is necessary to examine the part played by artillery power in war.

1. Artillery Power.

The commander of a force destined to carry out any operation of war, has at his disposal certain definite "powers" for the execution of the task. He might well be compared to a workman with a bag of tools preparing to carry out a job. It is left to him to decide which "powers" or "tools" to select, and how to combine their use.

If we examine the commander's "bag of tools," we find that they can be roughly sub-divided into two separate categories, namely :—

(a) Those intended to produce the "power of movement."

(b) Those intended to produce the "power of fire."

Since all military operations can only be accomplished by "movement," the tools contained in the former category must necessarily be the most important ones. But the nature of the work to be undertaken is usually such that the use of the "move-

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ment tool" is dependent on the "fire tool," and that without a combined use of the two, the efficiency of the former is seriously affected.

We see, therefore, that a close co-ordination in the use of the various tools is essential to a commander. Such co-ordination is impossible unless we are familiar with the characteristics of the various tools, so as to be able to decide the required combination of tools to meet a given task.

A brief examination of some of these tools is consequently advisable so as to decide on the use of the main "fire tool"—Artillery power—considered in relation to the others.

Up to 1914 the Infantry occupied the position of the "master tool." Its main value lay in its power of producing movement. The evolution of automatic firearms had certainly deprived it of a proportion of its power, but the fire power which it had been provided with was considered adequate to maintain its power of mobility without any excessive reliance on other arms.

We therefore see that in the Infantry and the Artillery we have two totally different types of "tools" or "powers," the former only developing fire power to assist its power of movement, whilst in the latter the power of movement only exists to assist in the production of fire power. These two "tools," therefore, are complementary to each other, and consequently must follow separate and distinct lines of evolution.

Since success in war depends on "the power of movement," and "movement" itself depends in a varying degree on "fire power," a study of the evolution of artillery can best be carried out by examining the factors which affect "artillery power." We must have in front of us a clear conception as to how this power can be increased if required, and its best application.

The first problem that confronts us is to arrive at some suitable standard by which we can measure the artillery power available at any given moment. The natural impulse is to seek a numerical factor, such as the total number of guns available, or the yards of front per gun. During the recent war this method became prevalent and led to serious miscalculations. If this system was correct, matters would be greatly simplified, artillery power would be increased or decreased by the single process of reducing or increasing the number of guns.

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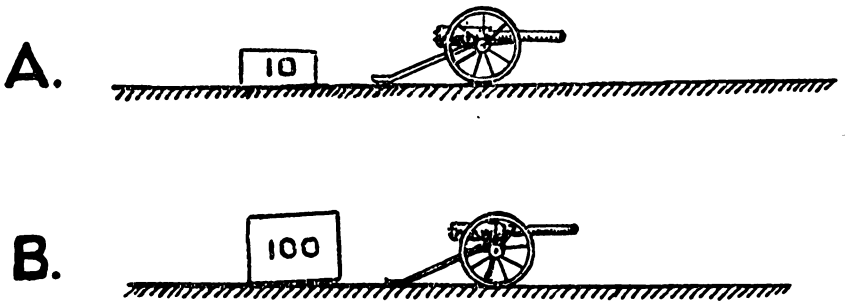
A moment's consideration will, however, prove that such a method of calculation falls far short of accuracy; for instance a single gun with 100 rds. of ammunition will be able to exert 10% more power than the same gun with only 10 rds. of ammunition and no facilities for replenishment.

DIAGRAM 1.



B is to A as 10 is to 1

There are evidently a multitude of other factors which influence artillery power besides the actual number of guns available, and it is the effect which these other factors exercise on the evolution of artillery power which require examining.

2. FACTORS CONTROLLING THE EVOLUTION OF ARTILLERY POWER.

In order to produce a process of evolution, we require in the first place an incentive for such evolution, and secondly facilities for overcoming any retarding factors that may exist.

Ever since the introduction of fire arms in war, improvements in these weapons have favoured the defence, owing to the fact that greater power can be developed from them when employed in stationary and covered positions.

We consequently see that in the conflict between the "fire power of the offence" and the "fire power of the defence," the latter has a decided advantage through the method of its employment. But, since success in war can only be obtained by means of offensive operations, a continual stimulus exists towards the evolution of greater fire power in an endeavour to crush the fire power of the defence.

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Since artillery occupies the first place amongst fire power producing arms, it is evident that a continuous stimulus must exist in connection with the evolution of artillery power.

Now if we turn to the possible retarding influences we find three primary ones which are worth examining in detail.

(a) *Facilities for transport of artillery material.*

To produce artillery power the employment of guns and ammunition is essential, we consequently find ourselves faced with the difficulties of transporting heavy materials within the theatre of war and in the field of battle.

As long as horse traction was the only means of transporting guns and ammunition, a distinct limit was imposed on the evolution of artillery power.

The introduction of steam traction at once opened new fields within the theatre of war, whilst motor traction further extended our horizon so as to include the actual field of battle.

The Great War commenced at a period when the full effect of modern railways on artillery power had barely been realised, and the mere fringe of motor traction had been explored.

We therefore find that the gate of transport difficulties had been opened wide, admitting of vast possibilities in the evolution of artillery power; and yet none of the belligerents appear to have fully grasped the possibilities afforded by the removal of this limiting factor.

(b) *Facilities for observation of fire.*

The effect of artillery power is directly dependent on its accuracy. The ranging power of guns had increased up to and beyond the limits of ground observation. Further evolution must consequently depend on the possibility of either increasing the powers of observation of fire, or of perfecting the accuracy of unobserved fire.

The recent introduction of aircraft had furnished the necessary means for extending our field of view, whilst the evolution of gunnery had reached a stage when accurate unobserved fire was well within the reaches of possibility.

We therefore find that on the eve of the Great War, a second retarding factor had been removed opening new fields of evolution.

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(c) *Facilities for inter-communication.*

Finally the existing facilities for inter-communication must be considered.

In the Napoleonic Wars, with short ranging guns, we had seen that no necessity existed for any artificial means of inter-communication within the artillery, and between it and the other arms. Concentrations of fire were obtained by concentrations of guns, and when concentration of fire units exist the necessity for artificial inter-communication does not arise.

As ranges increased the concentration of fire from dispersed batteries became desirable in order to develop the full artillery power available. Such a procedure necessitated a reliable means of inter-communication.

Again the increased ranges of both guns and small arms having extended the field of battle as regards length and depth, the necessity for reliable inter-communication between the artillery, and the other arms supported by it, became essential.

Here again recent inventions had removed previous retarding influences. Telegraphy and telephony had made sufficient progress to be in a position to bridge the widening distances within the artillery organisation, whilst wireless telegraphy and telephony promised further future facilities.

3. Possible Lines of Artillery Evolution.

Having established the fact that an incentive for evolution existed, and that the main limiting factors had been greatly reduced by modern inventions, we may now turn to examine the possible lines of artillery evolution. For the sake of simplicity we may classify them under the following five headings, which we shall examine in detail:—

(a) Rate of fire.
(b) Weight of fire.
(c) Range of fire.
(d) Control of fire.
(e) Accuracy of fire.

4. Rate of Fire.

The rate at which fire power can be developed depends on three main factors:—

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(a) The rate of fire of individual guns.
(b) The number of guns available.
(c) The rate of ammunition supply.

(a) *Rate of fire of individual guns.*

If we consider the gun by itself, irrespective of its ammunition supply, we see that a distinct limit exists to the rate of fire that can be developed, due to strain on the equipment and fatigue of personnel. In 1914 the French 75 was capable of some 20 rounds per minute, whilst the 18 pr. could reach the figure of 10 or more rounds in a minute. These figures approached the limit of evolution without radical changes of equipment, but these rates of fire were already so far in excess of the existing system of ammunition supply that little scope for evolution was left in this direction.

(b) *Number of guns.*

An increase in the rate of fire by an increase in the number of guns employed is self-evident, and calls for no special comment.

It is, therefore, not surprising that the first steps in the evolution of artillery power during the Great War were in this direction.

(c) *Rate of ammunition supply.*

We have now arrived at one of the landmarks in the evolution of artillery power during the war, and consequently one worth examining in some detail.

In the first place the fact must be clearly recognised that a gun and its system of ammunition supply are two inseparable things. The relation which one bears to the other might be compared to the nozzle of a fire hose and the water system to which it is connected. A gun detached from its system of ammunition supply becomes as useless as the nozzle of a fire hose detached from the water pipe.

Further, if the "nozzle" of our system of ammunition supply is capable of discharging 10 rds. per minute for limited periods, the system must be such as to be able to supply ammunition at the rate of 10 rds. per minute if we wish to develop its full power. But, our "nozzle" will only stand this rate of discharge for very limited periods, is better suited to a more moderate rate of discharge, and will remain "turned off" for prolonged periods;

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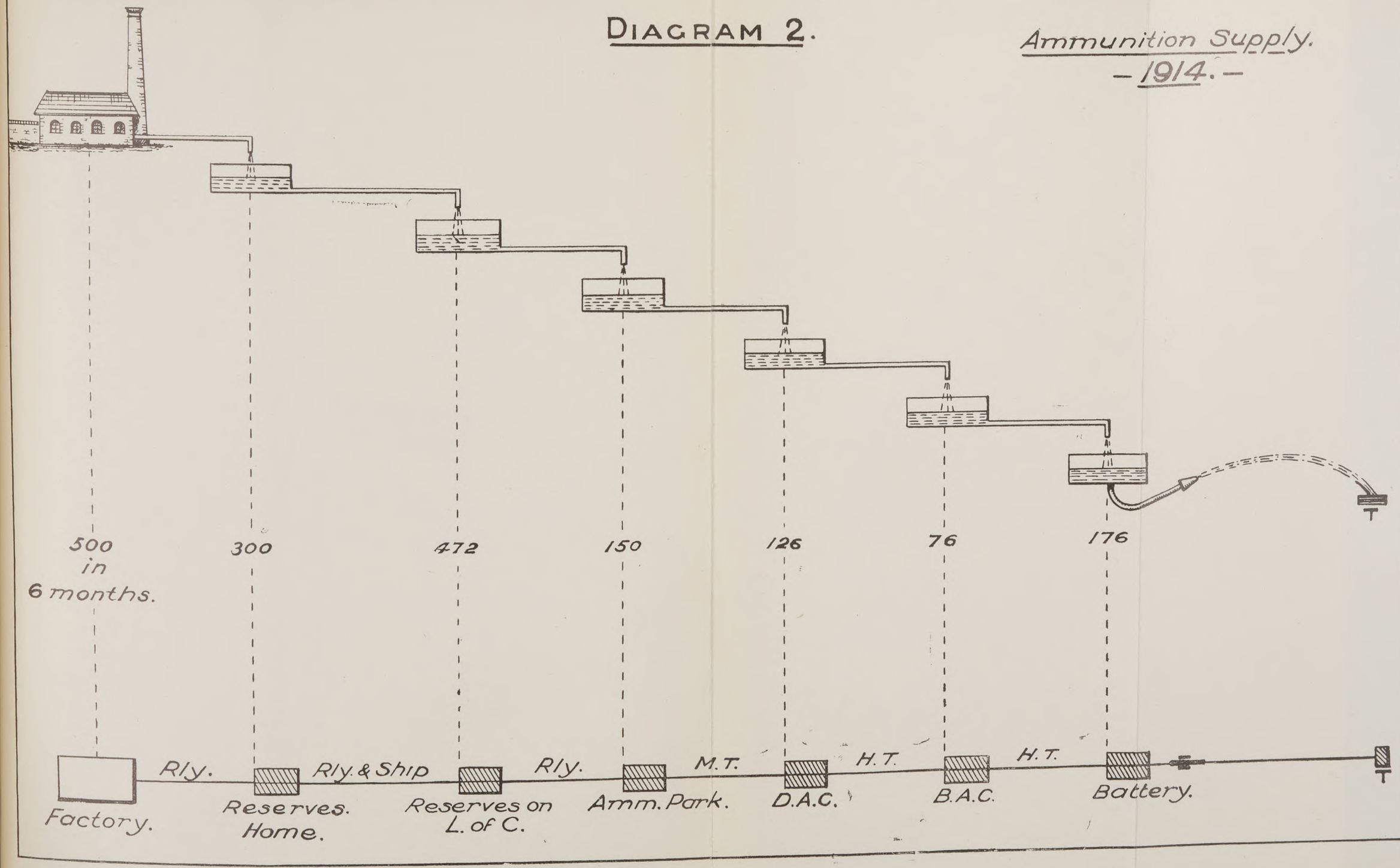
DIAGRAM 2.

Ammunition Supply. —1914.—



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consequently we require a variable "water pressure" behind our "nozzle," a condition best attained by a series of adequate reservoirs in our system of supply.

We must, therefore, examine the system of ammunition supply existing in 1914, with a view to estimating whether the flow of ammunition provided was adequate to develop the full artillery power of the system considered as a whole. (Diagram 2.)

In War Establishments Part I, 1913, the following were laid down as the number of rounds per 18 pdr. gun in the field.

	Rds.
In the battery	176
In the Bde. Amm. Col.	76
In the D.A.C.	126
In the Amm. Park	150
Reserves on L. of C.	472
Total in the field	1000

In addition to the above the following were allowed for :—

	Rds.
Reserves in England	300
From factories in 6 months	500

Now, if we examine the "reservoirs" in connection with our "nozzle," the possible lines of evolution become apparent.

The "reservoir" of 176 rds. at the battery would meet the requirements of 44 minutes at 4 r.p.g. p.m.; but to replenish itself would set in motion all reservoirs up to the L. of C.

Three such periods would empty all reservoirs in front of L. of C., whilst a further three periods exhausted all reservoirs in the field, and left a reservoir of 300 rds. at home for a final burst of 75 minutes !

The total reserves allowed for approximately 60 minutes fire at 4 r.p.g. p.m., per month for the first six months of the war !

We have, of course, up to the present only been considering the case of a single gun. The employment of several "nozzles" on the same water system simplifies matters when all "nozzles" are not turned on simultaneously. But with a total of only 480 guns in the

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Expeditionary Force it was not likely that "nozzles" would be frequently turned off.

Evidently any evolution in artillery power must be accompanied by corresponding improvements in our methods of ammunition supply. The system as a whole was not greatly at fault, the size and distribution of the various reservoirs might require minor alterations entailing only small changes; but the real flaw in the whole system lay at the "source."

The best system of conveying ammunition from the base to the guns, would become useless if reserves, and rate of production, could not ensure an adequate flow of ammunition.

We therefore find that by 1914 the evolution of artillery equipment had outrun the evolution of its ammunition supply, and as a result only a small proportion of the available artillery power in the field could be developed. It required the realities of war to open our eyes to the requirements of artillery in modern battle.

5. Weight of Fire.

Under the above heading we shall now examine the question of the actual weight of shell discharged at a given object within a given time.

Weight of fire must evidently depend on the following three factors :—

(a) Rate of fire (which we have just considered.)
(b) Concentration of fire (which we shall discuss later.)
(c) Weight of individual shells.

It is the last of the above three factors which we must examine at present.

For certain definite purposes artillery power can be increased by employing large calibres, the limiting factor being weight of equipment and weight of shells. We have seen that evolution in methods of transport by mechanical means had rendered possible the employment of heavier equipments, evolution in weight was, therefore, only dependent on necessity arising for the employment of additional artillery power of this nature.

The Germans had already recognised such a necessity, and as a result their artillery was in an advanced stage of evolution, in this direction at any rate, when compared to the French and ourselves.

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6. Range of Fire.

Prior to the Great War, artillery tactical doctrines had barely emerged from the Napoleonic conceptions of "massed guns to obtain concentration of fire." The possibilities of obtaining concentration of fire from dispersed batteries were only just beginning to be appreciated. In our ultra mobile conception of war, reliable methods of inter-communication presented serious difficulties, and yet were essential for concentration of fire from dispersed batteries.

It is, therefore, not surprising that the advantages of increased ranges, when considered in connection with problems of concentration of fire, were not fully appreciated. Whilst, on the other hand, the tactical doctrines of artillery support in the attack necessitated a clear view of the ground over which our infantry attacked combined with voice control of the guns; clearly long ranges were of little advantage under those conditions.

Again, extreme ranges were of doubtful value without adequate method of observation, and observation from aircraft was in its complete infancy whilst accurate unobserved fire had not yet been seriously considered.

It is only natural that under these circumstances no serious steps had been taken towards increasing the possible ranges of guns. In fact, a proportion of the available range of many equipments had been voluntarily sacrificed by employing carriages which did not admit of full elevation and by the use of projectiles subjected to high resistances during flight.

Great possibilities consequently existed for the evolution of artillery in this particular direction, and progress was only dependent on the necessity for increased ranges being demonstrated by the war.

The facilities for carrying out concentrations of fire are directly affected by the ranging powers of the guns in question. For instance in the following diagram No. 3, A and B represent two guns placed 6000 yds. apart, it will be seen that if the maximum range of these guns is 6000 yds., the area in which concentrations of fire can be carried out, at ranges over 3000 yds. corresponds approximately to an equilateral triangle of 3000 yds. side. If we now substitute guns with a maximum range of 9000 yds. our possible area of concentra-

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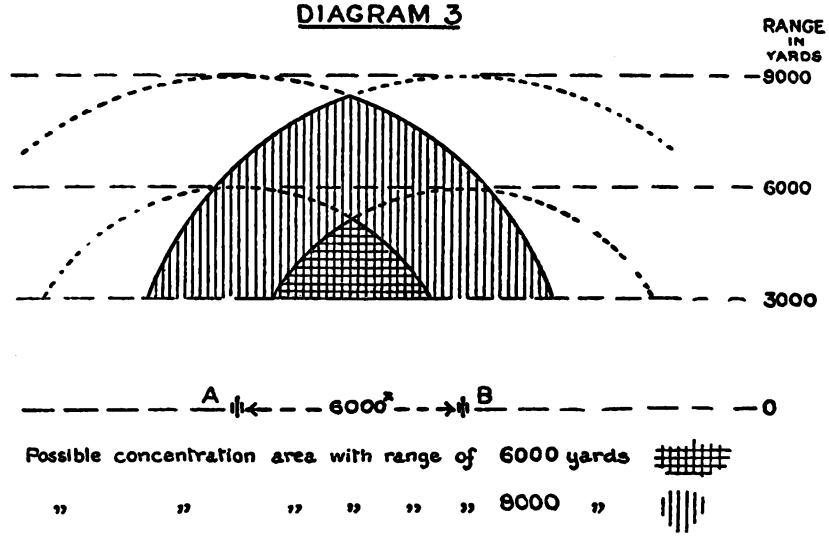
tion is increased to a rough equilateral triangle of over 7000 yds. side, namely more than four times the previous area.

DIAGRAM 3



The advantage conferred by long ranges on the power of concentration are consequently obvious and require no further elaboration.

Again, it is a recognised fact that our present artillery on the move is incapable of developing any fire power, consequently in a prolonged infantry advance periods must arise when the artillery power available to support the advance is necessarily reduced owing to a proportion of the batteries being forced to move through loss of range. An increase in ranging power, reduces the necessary moves during the critical periods of the attack, and consequently increases the total artillery power during the decisive periods of the encounter.

Finally, modern war necessitates the assembly of masses of men, animals and material, at the decisive point; the further away from the front of attack that these masses can be forced by long range fire, the greater will the effect be on the hostile attack through loss of efficiency.

We see, therefore, that sufficient factors existed to provide the necessary stimulus towards evolution in the ranging power of artillery.

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Turning to the technical aspect of such evolution, we find three distinct methods for prolonging the ranging power of guns :—

(a) By increasing the muzzle velocity.

(b) By increasing the elevation.

(c) By reducing the delaying factors during flight. The first of the above offered only limited scope for progress, owing to consequent wear of guns. The second provided distinct possibilities since the majority of the gun carriages only admitted of very limited elevations. The third opened up a field which had hardly been explored in connection with artillery, although recent changes in small arm ammunition had provided evidence as to the effect of special shaped projectiles.

7. Control of Fire.

We have already seen in the previous article that decentralization of control had been adopted as the keynote of artillery tactics in 1914.

We must now examine the effect of decentralisation on artillery power, in order to realise the sacrifices which such a procedure entails, and the consequent line of probable evolution.

In the first place the fact must be accepted that every equipment with a given arc of fire, and a given range, is capable of engaging targets anywhere within the area bounded by that arc and the range. In order to be able to develop at all times the full power of this piece it is evidently necessary that it should be in the hands of a commander whose normal "zone of interest" is equal to, or greater than, the zone covered by the piece. By "zone of interest" is implied the area limited by the flanks of the formation under the orders of the commander in question, and up to a depth in advance of the front line equal to his direct interest considered in connection with the operation he is engaged in. This "zone of interest" must necessarily remain very elastic as to its boundaries, but is sufficiently definite for our present considerations.

For instance, if we place a gun with a range of some 10,000 yds. under the direct control of the commander of an Infantry Bde. attacking on a 2000 yds. front we shall be voluntarily sacrifcing a

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large proportion of the area covered by that gun, namely we shall forfeit a proportion of the fire power of that gun.

Theoretically, therefore, the matter seems easy of solution, and all that requires to be done is to organise the system of artillery control, so that the command of the various natures of guns is distributed to formations in accordance with their ranging powers.

Appendix C shows diagrammatically such a distribution of equipments. A defensive Corps front has been shown and arcs of fire of 60°, with ranges corresponding to actual maximum ranges, have been superimposed at the same scale. The zones of interest are naturally theoretical, but convey the required close connection between ranging power and control.

Practically, matters are not so simple, and are seriously affected by the efficiency of the system of inter-communication.

Evidently the most perfect theoretical distribution of guns based on their ranging powers, breaks down entirely if their fire power cannot be turned instantaneously where, and when, required. And in a theoretical endeavour to save a proportion of our fire power we may sacrifice the whole, if our system of inter-communication is inefficient.

Since the efficiency of inter-communications varies inversely with the degree of mobility of the operations, it is not surprising that in 1914, with our conception of a highly mobile war, we should adopt decentralisation of control with its consequent sacrifices of power sooner than risk losing the whole.

As a conclusion we may look for evolution in control of artillery resulting from a class of warfare of a more static nature than our pre-war conceptions, and as a direct result from any improvements or methods of inter-communication in the field.

8. Accuracy of Fire.

It will simplify matters if we start by sub-dividing accuracy of fire under two distinct headings:—

(a) Accuracy of observed fire.

(b) Accuracy of unobserved fire.

(a) *Accuracy of observed fire.*

All tactical doctrines of 1914 were based on the employment of observed fire, where accuracy depends on the eyesight and quickness of the commander, and the degree of training of all ranks.

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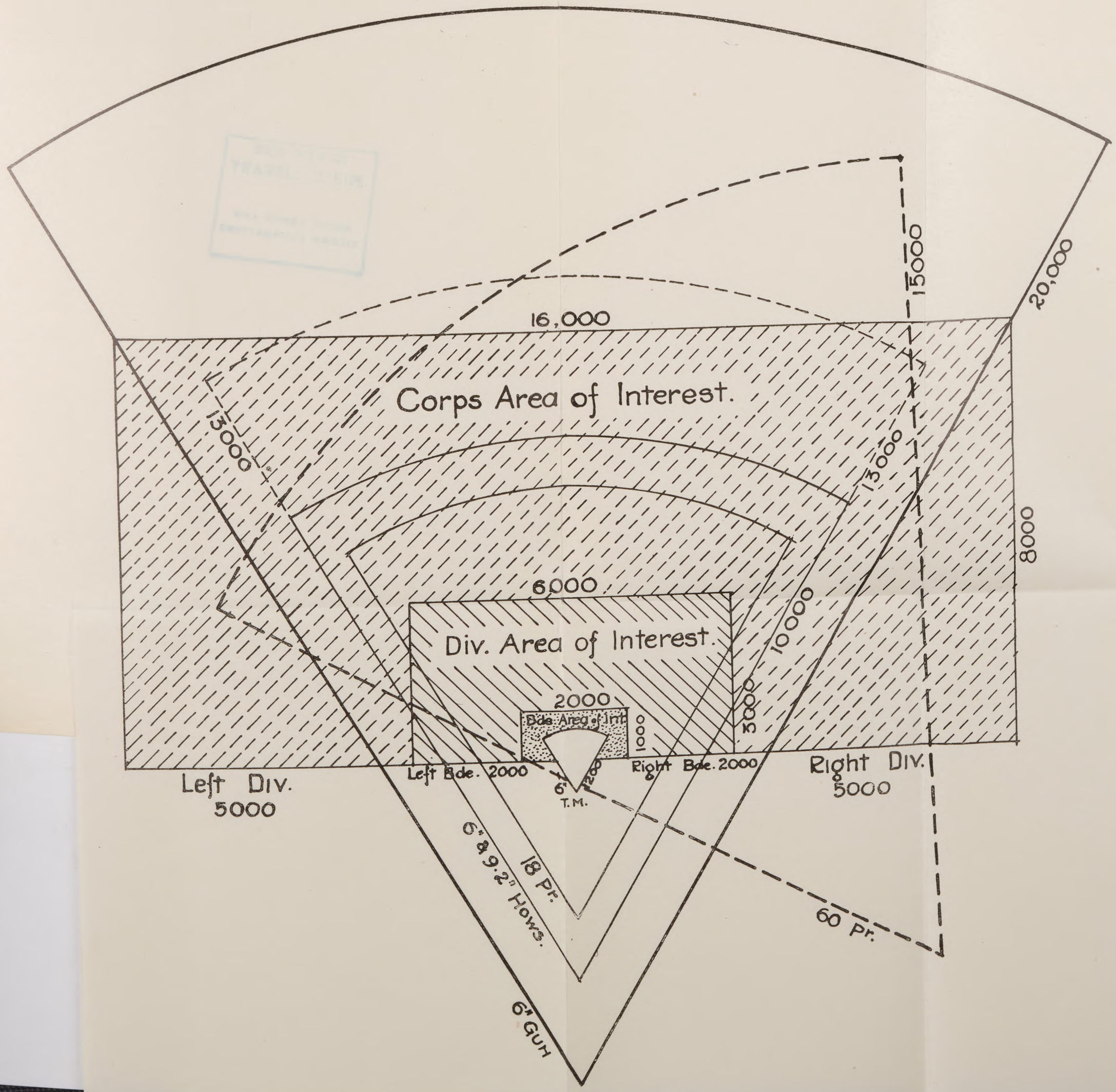
APPENDIX C

EVOLUTION OF ARTILLERY



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of the commander, and the degree of training of all ranks.

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Observed fire must always present indisputable advantages when facilities for observation exist, and when tactical considerations admit of its use.

Further evolution in the accuracy of observed fire left little scope, a stage had been reached when accuracy must become indepedent of observation.

(b) *Accuracy of observed fire.*

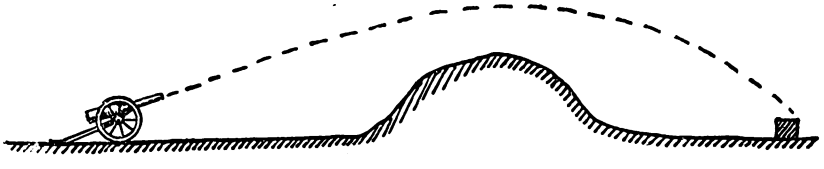
Prior to 1914 the question of accuracy of unobserved fire with field equipments had not been seriously considered. The accurate maps and intricate calculations required for such a procedure did not coincide with our conceptions of a war of movement: and yet the increasing tendency to employ concealed artillery positions combined with the necessity for neutralising hostile artillery, pointed towards required improvements in this direction.

Again, in the support of an attack, observed fire necessitated a clear view of the target to be engaged and of our own troops. Would not circumstances arise where targets could not be located from observation stations, and their very existence only known through messages referring to maps?

Artillery power that could only be applied under direct observation lost half its efficiency through darkness, mist, and the smoke of battle.

DIAGRAM 4

A. Artillery Power dependent on Observation of Fire



B. Artillery Power Independent of Observation of Fire

Where observation is possible B is to A as 1 is to 1
" " " impossible B is to A as 1 is to 0

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It is, therefore, evident that although observed fire must always possess overwhelming advantages over unobserved fire, yet in our research for lines of evolution of artillery power we strike a promising avenue through increased accuracy of unobserved fire.

Were the requirements such as to render such evolution possible?

In the first place large scale accurate maps were required, by no means an insurmountable difficulty in a civilised theatre of war.

Increased knowledge of survey by artillery personnel, accurate methods of calibration, meteorological reports, and systematic sorting of propellants, were the main difficulties to be overcome, these were certainly not insurmountable, and it is surprising that evolution moved as slowly as it did in this particular line.

9. Conclusion.

This concludes our brief examination of the possible lines of evolution of artillery power during the war.

We have seen that artillery tactics, equipment and organisation had been prepared to meet the requirements of a war of movement, and were all radically affected by this highly mobile doctrine.

We have also seen that the war broke out at a period when the full effect of recent inventions such as railways, motor traction, aircraft, telegraphs, telephones and wireless had not been fully appreciated in connection with their effect on artillery power.

We should now be in a position to appreciate the extensive field open to artillery evolution at the outset of the war, and to realise the general lines it would follow.

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QUIETA MOVERE.

By Colonel C. F. Phipps, d.s.o., R.A.

THE original saying is, of course, "Quieta *non* movere," but, since all conventional maxims and proverbs are untrue, I have made a justifiable inversion of the meaning by omitting the word "non," so that, instead of repeating that it is well to let sleeping dogs lie, we are here considering how movement may be introduced into the life of bodies which are found in a state of rest. For there is nothing within the bounds of the military life that is allowed to remain just where it is. Everything, from the dearly-loved battery number, with its great traditions, to the most monstrous and sedentary of guns, moves on and passes. The particular case which I wish to consider is that of the training of batteries which are to a certain extent immobilised in stations by the sea.

The Coast Defence connection remains at present with the Regiment. In speaking of it, it is very desirable to avoid the inherent controversies. Now we see daily in the newspapers how clever men settle controversies. They explore an avenue, and they find a formula. The formula is the difficulty. It must be non-contentious, that is to say it must be such that none of the interested parties can find in it anything to which to object. This is secured in either of two ways, either by so constructing its sentences that they are capable of different interpretations by different persons, or by so constructing its sentences that they are not capable of any interpretation by any person. Needless to say, the last is by far the safer method.

The formula by which I should propose to approach the question of coast defence is this :—

> "Pending the possible introduction, in such measure as Expediency may dictate and Economy may modify, of those inventions which might influence Policy, and, through Policy, the nature and organisation of Coast Defences, it will be useful to employ the interval, if any, in extracting

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> the best value from the present Coast Defence connection of the Royal Artillery, as regards the training of batteries stationed at Coast Ports."

I am not sure that this is a good formula. I doubt whether the statements are sufficiently qualified. The style is necessarily that of military prose, but I may point out that there *is* actually a principal verb of the sentence, and that is always something.

But now as to training. What pearls can we pluck from the ocean? In the first place, coast defence shooting is a good lesson to learn. It is a lesson in mobility; a truly alarming statement, until we consider what mobility is.

Mobility does not consist in moving a man rapidly from place to place by means of a horse, a car, an aeroplane. Fourteen stone of dead weight may be transported in this way, but what object is gained? The use of the horse, the car, or the aeroplane is to move from place to place a mobile brain, ready to deal quickly with whatever situation it finds. If the mind, at the end of a journey, cannot devise a reasonable line of fire for the guns dependent on it, if the fall of shell is followed by no perceptible movement of the grey matter of the brain, then we may say that what has been gained by movement of body has been lost by immobility of mind. May one venture, very cautiously, to suggest that this does happen at practice camps, and not infrequently; and that one of its causes is lack of imagination? If the long green slopes are so clearly empty of enemy, if it is so certain that a wooden dummy cannot walk, then indeed the stimulus of tactics fails, and the only way to compel quickness is to put the mobility into the targets.

Here comes in the advantage of coast defence shooting. The targets proceed rapidly across the front, in one or two minutes they will have gone, and no human battery commander can fail to be fired with a desire to think quickly and to smite them ere it be too late. It is a good lesson, that is to say, it prepares the mind for the more difficult systems of land-ranging, it is a stage in which observation is often, but not always, easier than it is among the folds of the land, a stage in which quickness is absolutely forced on the officer and on his men.

There is, of course, a tremendous lot more than this in coast defence shooting, but I am at present merely plucking pearls from

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the ocean in order to present them to land artillery, I am not considering what practice seawards would be like at really long ranges, with full charges, and against targets whose speed and course varies often. But I am sure that it is very important to convince people that a course of coast defence practice, apart from its own intrinsic functions, will quicken and improve an officer of any conceivable branch of the regiment, no matter by what method or at what pace he may be accustomed to convey his mind across country.

Especially is the subaltern catered for. Does any form of artillery shooting demand in so pronounced a fashion keen supervision, ready initiative, quick observation, and strong power of command, as does the "light Q.F." series? I do not say for a moment that everything in coast defence, however good in itself, is calculated to prepare the soldier for land artillery methods; I am, I repeat, merely gathering gold and picking up pearls from the sea. Now I come to some real gold, which should be passed on by heavy batteries at the sea to all branches on the land.

There is in coast defence practice reports a little column which rubs in the value of time in relation to quick decision; it shows the time at which each order was given by the B.C. and the time from zero at which each gun was fired, zero being the order to commence firing. This time is taken with a stop watch by one of the recorders. It enables the B.C. to see, when making out his report, exactly where he gained or lost a few seconds.

For instance here are two cases:—

EXAMPLE 1.

Order.	Time given	Time when gun fired	No. of round	No. of gun
"Fire"	0′ 00	0′ 00	1	A 1
"Drop 200"	0′ 17″			
"Fire"	0′ 19″	0′ 21″	2	A 2
"Add 100"	0′ 38″			
"Fire"	0′ 42″	0′ 43″	3	A 1

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EXAMPLE 2.

Order	Time given	Time when gun fired	No. of round	No. of gun
"Fire"	0′ 00	0′ 00	1	A 1
"Drop 200"	0′ 23″			
"Fire"	0′ 25″	0′ 26″	2	A 2
"Add 100"	0′ 51″			
"Fire"	0′ 55″	0′ 56″	1	A 1

If in both these cases the time of flight was 15 seconds, it is clear that A.1 landed in the sea (in the first example) at 15 secs. after zero; the B.C. gave the correction necessitated by that round at 17 secs. In other words the B.C. took 17 - 15 =2 secs. only to make up his mind and give the correction. In the second example it is clear that the B.C. took 23 - 15 =8 secs. In the first case, therefore, he is to be commended, in the second he is to be boiled.

What rubs it in still more is the fact that the B.C. is trying to keep within the "standard time" for the series; he has to beat bogey if possible and to do so he must consider how he can save seconds. It is impossible in land shooting to fix a standard time for a series, as so many considerations come in—gun platforms, nature of the country near the target, and so on. But everything cries aloud to us to imitate the coast defence system to this extent—that, whether at the miniature range or at practice, the time between fall of shell and B.C's next order should be taken with a stop watch and recorded right through the series. A little column to show this might well be introduced into our land practice reports in such a way as to spring to the notice of the B.C. and confront him with his crimes. What, in effect, does slow ranging mean normally? It means that the B.C. is permitting himself a recurrent delay which he would tolerate neither in his G.P.O., his signallers, his layers, his gunners, or his drivers. He is not fulfilling his part of the contract. It is unnecessary to labour the point. Quieta Movere.

Let us now boldly face the disabilities and limits imposed by life at the seaside and see if some of these very limits and disabilities can be turned to profit. Well, the sea cuts off half the ground

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which might have been available for land artillery training, but it provides at our front door an excellent artillery range. Heavy batteries, by an admirable arrangement, are to shoot every other year on land ranges *as* heavy batteries, and for this the sea affords a great opportunity of elementary practice. All that is wanted is a few light guns, a small yearly allotment of ammunition, and some anchored targets. The actual fort or the W.D. land surrounding the fort probably supplies a covered position.

The guns will in all probability have to be manhandled into action; they will consequently have to be formed on a road within a few hundred yards of the position. Four 18-prs. are probably the most suitable guns. While, however, the "teams" remain there, champing their bits impatiently, the B.C. and battery staff appear on some appointed road (mounted, in those stations where horses can be kept, on foot at others), are met by the Instructor, and receive the "situation." In Ireland we have had to imagine the B.C's staff to be at some point on the map further away than they really were.

Well, the B.C. gives his directions to his satellites and proceeds to his reconnaissance; by the scheme, or by an unblushing "practice camp" order, he can be influenced to use such ground for his O.P. and to assess his line of fire by such method as the Instructor may desire him to practise. Using only the vicinity of a fort, we are able in Ireland to introduce every sort of O.P., with horrid apex angles or difficult communication. The Artillery Code of course is triumphantly introduced. In the inculcation of quickness it is a good thing to order—"Maps to be used for tactical purposes only, not for measuring angles." The G.P.O. should also be beset by an Instructor, a really wicked man, who will order the aiming point to be changed between series—a low-down trick, upsetting the parallelism. The battery leader, of course, having carried out the advance with imaginary guns, will allow the same time as would actually have elapsed, before he picks up his real guns and detachments and "proceeds to occupy the position." Here again every sort of frightfulness should be played off on him, the position having previously been marked out with sham obstacles, to make the occupation more difficult.

As for the targets, they must of course be anchored; a row of oil drums on a cable, anchored at each end, makes a good line of

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infantry; two barrels do for a section of guns; any shape of trench can be made with a cable with points marked by Hong Kong targets, etc. The advantage of this sort of elementary shooting is the comparatively easy observation, the large switches which can be arranged between targets, and the fact that (unlike practice camp) any convenient day can be chosen at any time.

Usually some 18-prs. can be procured for a coast fortress, with their equipment, and it will be a thousand pities if a small yearly allowance of ammunition cannot be granted. For a battery trained in this way will go to a land practice camp well-prepared to shoot as a heavy battery, and it can also keep up the training in the year in which it is at coast defence. Even without ammunition, all the other part of the practice can be carried out and the colour of movement in some small degree introduced into our drab lives.

Two observations present themselves. Firstly that the most difficult part of land artillery training (apart from questions of transport) lies in the assimilation of Chapter VI, A.T. Vol. I, and in the gunnery and laying. The actual gun drill is the easiest part to improvise. That is why heavy batteries by the sea require a light gun for practice in laying, for use with scanty personnel, and for movement by hand. Secondly it is certain that land and coast artillery training can both be kept up by heavy batteries; practice with coast defence guns can be done fairly early in the summer, and with 18-prs. over the sea about two months later. If it be said that batteries cannot learn *both* systems—well, an American was describing how he was shooting beavers and how an alarmed beaver ran up a tree to escape him. "But," said the audience, "beavers don't climb trees." "Well, this one *had* to!"

On the other hand a very reasonable proposition is put forward by officers who shoot with both systems. It is that the coast and land systems should be co-ordinated as far as possible. It is certainly most confusing to call two 6-inch guns "A.1" and "A.2" in May and two 18-prs. "No. 1" and "No. 2" in July. Also there are really *too* many official ways of giving deflection, "20 minutes more right," "20 more right," "right 4." It does seem to be an unnecessary complication. Equipments vary, but within the limits of their variation some sort of uniformity could be found. For instance, guns with deflection clickers necessarily require deflection to be

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given as "right 2," "left 4," etc. Then why should not all land and coast guns without these clickers say "right 20 minutes," or even "right 20," whichever is judged best? But I shrink from saying much on this subject, because experience shows that there are generally amendments lurking in the press, which jump out and bite you savagely, just after you have committed yourself.

There is another, and a very excellent, form of mitigating the disadvantage entailed by the lack of transport in heavy batteries; but it causes an expense to training grants. It is this—the officers and battery staffs, being (it is presumed) mounted, according to establishment, can attend divisional training or manœuvres as a skeleton battery, practising the liaison with infantry, reconnaissance, communications, and in fact Chap. VI, Vol. I, Artillery Training. The battery which I had the honour to command did this in 1913, for the first part of divisional training, with the division for which it was earmarked on mobilisation. For the latter part and for Army manœuvres, in this case, the training grant ran to the hire of heavy draught horses for the guns. The great advantage, even of the skeleton part of the business, was that next year, 1914, we worked with the same infantry and the same artillery from Mons onwards. It is good that a division should sometimes deal in peace with the heavy batteries which it will inevitably demand at the commencement of the next war.

In batteries by the sea, the line to go on is the line of making evil lead to good. As thus, for example. We have not got the interest of possessing heavy draught horses or up-to-date dragons. This is evil, but it means we have more time to spare. *Therefore*, we can spare officers sometimes to be attached to infantry for battalion, brigade, or divisional training. A period by the sea seems to afford a good opportunity for this.

It may be said that imagination enters very largely into some of the "stunts" which I have mentioned. It does, but are we not an imaginative regiment? We found our gunnery on definitions which are the product of a sentimental, and even a morbid, imagination. Who, for instance, has ever seen "a straight line joining the muzzle of the gun and the target"? And what wilder stretch of fancy can be conceived than to assume the surface of the sea to be a horizontal plane?

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I believe that there are pearls to be plucked from the ocean. But, under the amalgamation, it will not be necessary to spend a life in this employment. Inevitably comes the healthy desire for change and movement, even to those for whom it means the reconnaissance for houses and for domestic servants. Some will leave the sea for the grim natural tangents of the Himalayas, others for the gentle cosines of Larkhill. Well for them if they have gathered some lesson to take with them when they go—

> "Always a little further: it may be
> Beyond that last blue mountain, barred with snow,
> Across that angry, or that glimmering, sea."

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A TERRITORIAL FIELD BATTERY.

By Major J. A. Dane, d.s.o., R.A. (T.A.).

Introduction.

THE fact that the Territorial Army now occupies a relatively more important position in our military scheme of things than it did ten years ago might be expected to lead regular officers to take a correspondingly increased interest in its affairs. The following notes on the second line Artillery may therefore be of interest to those serving in the regular branch of the Regiment. Be that as it may, it is probable that they will interest those T.A. officers who may happen to read them.

One has felt for some time that there is a great opening for the discussion of Territorial Artillery subjects in the Journal. If one was working in any other "voluntary organisation," e.g. the Boy Scouts Association, one would have one's monthly or quarterly magazine or paper, published by the organisation, to assist one with new ideas and improved methods. T.A. officers are invited to take the Journal. It would be a great encouragement to them to do so if from time to time articles appeared in it dealing particularly with T.A. topics. One welcomed in this connection the recent article by Captain Frith, which appeared whilst these notes were in course of preparation.

As conditions must vary tremendously in different parts of the country, the writer thinks it only fair to point out that the opinions he expresses are based solely on his own limited experience during the last three years as a Battery Commander at a single battery station remote from other artillery units.

The Battery.

Personnel. On the whole the men are of a very similar type to those who join the regular army. Very few with war service join, and the difficulty is to secure men suitable for specialist duties and for promotion. The Nos. 1 in particular are a great problem, and it would appear essential to enlist ex-regulars as B.S.M. and B.Q.M.S.

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The trouble is that there was a complete break after the war, and now one has practically none of the old hands to carry on the old traditions. The mischief was done in the opinion of many when such a long delay was allowed to take place between demobilisation and the reconstitution of the Territorial Force. When at last the writer's battery was re-formed it was a case of starting afresh, with none of the pre-war officers and only a very few of the men. One gathers that some units were more fortunate. As regards promotions one is not helped by the ruling that Lance Bombardiers may not be paid as such in peace-time.

Up to date, in spite of various recruiting efforts, the strength of the battery has never exceeded 80% of its peace establishment. One's only comfort is that this appears to be about the average strength of other units in the division. From what one hears service in the Territorial Army of to-day does not appeal in the same way as did service in the old Volunteers, nor is the same class of recruit attracted. One hears of batteries having a waiting list and charging an entry fee for recruits, with the idea of raising the standard of men enlisting. But the writer does not quite see how these measures can be adopted when a battery is below establishment and recruits are few and far between !

The peace establishment is such that if the battery is within 20% or so of its establishment it can turn out four guns and four wagons, with staff, fairly comfortably. As one never gets anything like one's full strength on parade except during annual training, it is only then that one can parade as a battery.

Briefly stated the terms of service are :—

Age.—18 to 38, with certain exceptions.

Period of Enlistment.—4 years, with extensions.

Obligations.—Embodiment; on Army Reserve being called out in case of imminent national emergency.

Liability for service overseas; provided a special Act of Parliament is passed authorising the despatch overseas of the T.A. Men so sent overseas will not be permanently drafted to units other than their own.

Training in Peace-time.—As described later.

Except when embodied, officers and men of the T.A. cannot be called out in aid of the civil power as a military body.

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Horses. The horsing of the T.A. is a most difficult problem, no doubt more acute in some places than in others. Previously to the war the County Associations in some cases purchased numbers of L.D. horses, which were boarded out in the vicinity of the various unit headquarters. This was the method adopted in the case of the writer's present battery. The advantage of this plan was that the horses were always available for preliminary drills, and formed a nucleus of trained horses at annual training and on mobilisation. Since the war an attempt to put a similar scheme into operation has proved entirely unsuccessful. There is not the same demand for what in civil life passes as the light vanner, our old friend the L.D. His place has been usurped to a large extent by the light motor-van. So one has to be content with the very indifferent cattle provided by local contractors.

In the not very distant future it may be expected that territorial field batteries will be mechanicalised. Except for sentimental reasons one will welcome the change. Just let us consider what happens now when a battery goes to a practice camp. At 6 a.m. on the platform of a hillside railway station in Wales, the battery detrains after an all-night journey. It is pouring with rain, as it usually does on these occasions. Tied up to the fence on the opposite side of the platform are a miscellaneous collection of horses which the Adjutant informs one are to be "ours" for the next fortnight. They have just arrived by the previous train and are an entirely unknown quantity. There is no guarantee that they have ever been in a gun team before. One's task is to get them harnessed up with harness that does not fit, hooked in and driven by drivers that in many cases can scarcely ride—much less drive, along a narrow and hilly road to the camp some three miles distant. Whilst the harness is still being disentangled one is told that the next battery's train will be in in five minutes, and that the siding must be clear by the time they detrain. Fortunately their train never does arrive in anything like five minutes, and by great exertions and the expenditure of some frightful language (which it is hoped that the Welsh-speaking natives don't quite understand) the battery at length moves off. We need not follow them in their subsequent adventures, but it must be admitted that the task set the

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young partially trained territorial driver is one that would try very highly even a fully trained regular.

With M.T. one would have drivers whose job in life it was to drive motors of some sort, and subalterns whose delight in many cases it was to tinker with the "innards" of an internal combustion engine. Poor lads, they are most of them at a sad disadvantage as horsemasters.

There seems little doubt that mechanicalisation will be a greater boon to the T.A. than to the Regular Army. Some experiments have already been carried out by certain brigades, and it would be very interesting if the results were made known. It is understood that motor lorries were used to draw the guns and to carry the detachments and ammunition.

During last year's training the policy was for Army Brigades to have M.T. whilst the Divisional Artillery Brigades were still to be horsed. No doubt this policy has been adopted partly owing to a reluctance to de-horse the Divisional Artillery until the efficiency of M.T. is clearly proved, and partly on account of the greater mobility which is desirable for Army Brigades. The irony of the situation lies in the fact that it is the latter that are almost entirely Yeomanry. Might not they remain mounted troops (as no doubt they would prefer) in the guise of Pack Artillery Brigades? At present with only one P.A. Brigade, T.A., in existence, thirteen divisions require to be completed. There appear to be approximately the same number of Yeomanry Brigades, a fact which would facilitate the re-organisation, although in some cases they are not in quite the right areas.

Clothing. Each man is issued with two suits of S.D. clothing, a coat warm, pair of boots, etc. The great difficulty is to prevent the pantaloons, slacks, coats warm and boots being worn off parade. It would be interesting to know how this can be best prevented. Previously to the war it was the custom for the nether garments to have a line of red piping let into the outside seams, with the idea of making them more easily discernable off parade. The practice has not been re-introduced, although it is much more necessary nowadays when large numbers of the civil population wear "Disposals Board" service dress.

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Equipment. Each battery is equipped with four guns and four wagons. Harness and other equipment is similar to that issued to regular units, although as regards some articles on not quite the same scale. During annual training of course all equipment is cleaned by those in charge of it. During the remainder of the year it is kept in soap and oil and looked after by the caretaker of the drill hall. After annual training and occasionally at other times additional men are turned on to help. They are chosen from the unemployed members of the battery.

TRAINING.

Annual. This is carried out under canvas over a period of 15 days, and as a rule every second year it takes place at a practice camp. With two brigades in camp together in the past it has been necessary to begin practice about two or three days after arrival. This did not give much time to create a "battery" out of a mass of individuals. This year it is understood that brigades will overlap by a week, which will give B.C's that period for drill before they have to start shooting. A great improvement.

Attendance at annual training for at least 8 days is compulsory, but practically everyone puts in the full 15 days. Pay and allowances at regular rates are issued to all ranks, provided they have completed their obligatory drills.

At other times. The number of obligatory drills (each of one hour) annually is, for trained men 20 (all before camp), and for recruits 45 (30 before camp). These numbers are of course merely the legal minimum, and not anything like what one must aim at if a reasonable standard of efficiency is to be attained. This is particularly the case with the signallers. The B.C's problem is how to get his men on parade more often. The writer has tried various means of achieving this end, but so far it must be confessed with only moderate results. League football is a great counter-attraction to Saturday afternoon parades, and one looks forward each spring to the end of the season.

Week-end Camps. These are financed by the Divisional training grant, and it is well worth while to obtain permission to hold a camp near battery H.Q. at Easter or Whitsun. Given fine

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weather one may expect anything from 30 to 50% of one's men. They receive pay and allowances provided the parades do not count towards obligatory drills. For some obscure reason officers do not receive any pay. As attendance is voluntary one can be placed in a rather awkward situation. After having got one's horses and indented for rations for a certain number of men who have said they will attend, it may happen that, perhaps owing to bad weather, a large number will change their minds at the last moment. One is then left with more horses and rations than one can do with. The former do not matter so much, except for the waste of horse hire and forage, but the B.C. may expect to be asked to refund the value of rations overdrawn !

Courses. Officers and N.C.O's are eligible to attend various courses at the School of Artillery, etc. A course at Larkhill or one run by a Gunnery Instructor locally is obligatory before Lieutenants and Captains can be promoted.

Officers. A good deal of instruction can be got in during the winter by means of evening lectures and miniature range practice. In the summer Saturday afternoons or Sundays can be used for skeleton drill orders, etc. But what the T.A. officer wants is to see a battery "in being." This he cannot get in his own unit, and excellent as are the courses at the School of Artillery they do not go into those questions of horsemastership and interior economy which are so important for the efficiency and welfare of a battery. Attachment to a regular battery is one solution to which we must look, particularly now that regular and territorial brigades are to be affiliated for training purposes.

Instructors. One regular N.C.O. is attached to each battery, termed the Permanent Staff Instructor. A great deal depends on the right man being selected for this appointment, and the T.A. looks to the Regiment to send only the very best. The tour of duty is for three years. On the post-war re-constitution of the T.A. two instructors were allowed. The advantage of this arrangement was that one could look after the training of the gunners, whilst the other supervised that of the drivers. Theoretically the men are supposed to be instructed by their own officers and N.C.O's, who are supposed to be trained by the B.C. with the

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assistance of the P.S. Instructor. In practice the presence of the latter is very necessary on most parades.

Bounties. In addition to pay and allowances during annual training all men irrespective of rank (but excluding officers) receive an annual bounty provided they put in the obligatory number of drills and attend annual training. For trained men the amount is £2 10s. and for recruits £2. An additional 10s. may be earned by qualifying as a layer, signaller or 1st class driver. A species of proficiency pay.

Standard of Efficiency. The standard attained must vary in different units. In any case it is not for a B.C. to say what standard his unit has reached, particularly if he has no opportunities of seeing other batteries. It may be said that at any rate a foundation is being laid, upon which to build whenever the T.A. may be embodied. It must be remembered, however, that on embodiment the strength of the battery will be approximately doubled if it is brought up to War Establishment, as may be expected. Thus for a time its efficiency will be actually lowered whilst recruits are being trained. Where the additional N.C.O's are to come from in such a contingency is a problem! A few regular or regular reservist N.C.O's would in such circumstances be of the greatest value.

DISCIPLINE.

For obvious reasons it is not possible to enforce discipline by quite the same methods as in the regular army. This does not mean that an equally high standard is not attained. One's chief reliance in on the idea of "playing the game for one's side," which after all should be the basis of true discipline in any body of British troops, regular or otherwise. If a man won't play the game the only thing to do is to leave him out of the side, that is discharge him.

Officers are at all times under military law, and the men when being trained or exercised.

In cases of absence without leave from annual training, failure to attend the obligatory number of drills, or deficiency of kit (including failure to hand it in on discharge) recourse is necessary to the civil courts.

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ADMINISTRATION.

The County T.A. Association. In this the regular soldier is up against something quite outside his previous experience. A Territorial Army Association is constituted in each county, its size being dependent on the size of the county and the number of units administered.

The Lord Lieutenant of the county is ex-officio President, and the members consist of (a) Military members (not less than half the whole number), appointed by the Army Council from amongst the past and present territorial officers of the county; (b) members nominated by, and representing, the County (and County Borough) Council; (c) co-opted members. The average Association consists of about 30 members. The secretary is a paid official, usually a retired officer.

An Association usually meets quarterly. A great deal of its work is done by committees, each dealing with some particular subject.

An Association is responsible for the administration of the units of the T.A. within its County area at all times other than when at annual training or when embodied. Its duties include recruiting, the provision of clothing, saddlery, drill halls, drill grounds, and horses or M.T. The provision of the latter also extends to horses or M.T. required for annual training, to and from which the Association arranges for the conveyance of units. In order to enable it to carry on its duties an Association receives a number of annual grants from the War Office. The manner in which these grants are administered varies in different Associations, and in any case it would be tedious to go into the matter in detail. As an instance it may be stated that the writer receives a certain sum annually as his "Establishment Grant." Out of this must be defrayed the wages of the caretaker of the drill hall, cleaning, heating and lighting the hall, postage and stationery, the wages of additional men employed in cleaning harness, and incidental expenses.

The general idea would seem to be that the Association should mobilise, so to speak, the latent patriotism of the county on behalf of the county units of the T.A. To the military mind, however,

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the machinery appears to be cumbersome, and it seems possible that the functions of the Associations might be performed by the Divisional Staffs (perhaps slightly enlarged on the administrative side) with greater efficiency and economy.

Battery Administration. The battery office is run by the Permanent Staff Instructor, who also supervises the cleaning of guns and harness.

The B.Q.M.S. receives an allowance of £50 per annum from the County Association. In return he is responsible for keeping his ledgers and for office work in connection therewith. The B.C. is responsible as in the regular army for all clothing, equipment and stores on charge. It will probably surprise territorial B.C's and possibly alarm some of them to learn that they are personally responsible for something like £20,000 worth of government and Association property! The safeguarding of this property and the prevention of deficiencies is the B.C's greatest anxiety. The writer feels very strongly that an unfair burden is thus placed on men who are rendering most valuable unpaid service to their country, often at the expense of their own time and money. In fact he cannot call to mind any similar instance in other departments of the national life.

Conclusion.

Whether the above remarks will interest regular officers is perhaps doubtful. On seeing the heading they will probably pass on to something more interesting, such as "How to Shoot our Batteries," or "Notes on Bashforth's method of determining *v* & *Kv*." It is hoped, however, that they will appeal to T.A. officers, and that some of them will be tempted to give us the benefit of their experience in connection with some of the points which have been raised.

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TRAWSFYNYDD, 1924.

Some Reflections in the Rain.

By Major P. I. Newton, D.S.O., R.A.

Prologue.

Ref.—O.S. map, Sheet 50. 1″ = 1 mile.

General Idea.

A SOUTHLAND Force of 1 Division, marching northward, was halted on the night of x/y at Dolgelley. G.O.C. intended to resume his march to Ffestiniog on the morning of "y."

Special Idea.

News having been received of enemy forces massing at Arenig Station, G.O.C. Southland Division detached a flank guard of 1 Brigade Field Artillery, and 1 Brigade Infantry, to march via the valley of the Afon Gain and sieze the high ground from Moel y Feidog to Moel y Slates, and hold it until the main body had reached Festiniog At 09.00 hours on "y" the head of the main guard of the flank guard *reached* Rhiw Goch, etc., etc.

Perhaps it would have been wise to insert the words "weather permitting" between "and" and "seize" in the Special Idea; for whether that is the reason, or whether there is another, the fact remains that the high ground is still in the possession of the enemy, in spite of the flank guard having been relieved again and again by fresh troops. So the Southland Division is presumably still at Dolgelley, and apparently fated to remain there until it returns one day, in disgust, whence it came, and is forgotten.

Meanwhile, for many weary weeks the battle for the heights has raged uncertainly (during the fairer intervals) up and down the valley between Rhiw Goch and Pont-y-Gain. Nor can O.C. Southland flank guard be fairly accused of lack of enterprise for his failure to bring the operation to a successful conclusion. His movements have been cramped by the impassable nature of the ground, by the fact that at a range of some 7000 yards the shell from his guns must pass from public to private ownership, and by the knowledge that the private owners do not want them.

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And what of the less fair intervals, the hours spent sheltering under the lee of a so-called "dry" wall, waiting for the rain to cease and for the enemy to become visible? They must be spent in meditation, for there is nothing else to do; and the results of some of the reflections on the part of the staff officer to O.C. Southland flank guard are set out below. If some of them appear to be unnecessarily soured and gloomy, it must be set down to the climate, which must surely affect the character of anyone condemned to experience it for long. And may it be permitted to hope that rumours of the impending dissolution of TRAWSFYNYDD as a practice camp are true; for it is a soul destroying business to wander up and down the AFON GAIN for four months.

* * * * * * * *

The foregoing is by way of preface, and I want, now, to put forward for consideration a few points that have suggested themselves to me, while watching practice, and while listening to the comments of officers of other arms on what they have seen.
The first is a point of tactics, viz. :—

I. *The further support of infantry in attack.*

Probably the most difficult problem the gunner has to solve, more difficult even than anti-tank defence, is the further support of infantry after a successful attack on their first objective. It is generally assumed that it will be done by means of observed fire, and it is recognized that the success of this is almost entirely dependent on communications. Firstly, it is necessary to get back information as to the positions of our own and enemy troops, positions which are constantly changing, and which in the conditions of chaos probably obtaining at this stage of the battle (conditions which at peace time manœuvres and practice camps, are impossible to reproduce), are extremely difficult to discover and report in time to be of any use. Secondly, it is necessary to direct fire in such a way as to overcome the obstacle which is holding up the infantry at the time.

It appears to me, that if the resistance is at all stubborn, no F.O.O., though he may compete with the first desideratum, and send back information as to the whereabouts and nature of the obstacle, will ever be able to control a sufficient volume of fire, by

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observation, to overcome it; even if he succeeds in keeping his communications open long enough to control it at all. On the other hand, if the resistance is fluid, he is unlikely to establish communication, supposing that he has had to move, in time to be of any use, and is more likely to hinder those infantry who are getting on, than to help those who are not.

I have heard the opinion expressed by infantry officers, that they would much prefer to conform to artillery fire than vice versa; on the ground that they can always see bursting shell, while the artillery can seldom see them, the infantry. So the answer to the first part of the problem seems to be a series of concentrations on localities where the enemy have been definitely proved to be putting up resistance. And these can only be done by predicted shooting; for registration requires observation, and therefore, reliable communications; and would probably take longer as well.

Prediction can be carried out easily enough when 1/20000 maps are available; and even with the 1″ gridded maps, surprisingly accurate results can be obtained, except perhaps in very hilly country where the angle of sight problem presents unusual difficulties. It is perhaps worth while emphasising the value that may be obtained by officers improving their maps at all times and all places, for they never know that details that appear worthless at the moment, may not become extremely useful later on. The same applies to an even greater extent to the 1/20000 plain grid, whether true or arbitrary, and if officers will get into the habit of taking rays to any conspicuous points they can see, in all directions, whenever they find themselves in a "fixed" position, or are able to fix themselves, results may be collated later on, which will prove of considerable value. Predicted concentrations can obviously be produced more quickly and accurately if the gun positions are already fixed, than if they have got to be fixed; therefore it seems to me that we require guns which can cover a day's advance without having to move. Moves to be done by big bounds at night. A range of not less than 15000 yards would appear to be necessary for this, and the present 18 pounder and 4·5″ how. do not meet the case.

There is still the question of the small resistance, while the fight is yet in a fluid state; a resistance which may be dislodged by very few rounds, provided that they are forthcoming *at once*, even though

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they do not actually hit anything. Such a situation may be dealt with by an F.O.O. so long as his communications last, by close support guns, close up, or by tanks. As far as close support guns are concerned this side of the picture has been rather apt to be passed over, in the various articles which have appeared on the subject (in the R.A.I. Journal and elsewhere), in the detailed consideration of small timed programmes on definite points or localities. But it appears to me that this is the true function of close support guns, and that to achieve success they must be handled singly, and with great speed. A battery or section may start intact, but must inevitably be broken up as the fight progresses, for no infantry can afford to wait half an hour or more, while the battery moves, or while a F.O.O. establishes a telephone line.

Infantry may often be able to deal with such situations themselves, and the possibility of their being able to do so must, of course, be borne in mind, but a few rounds, opportunely delivered, may save them casualities, and will certainly save them time.

Whether the 3·7″ how. is the ideal weapon for the purpose described above, is, I think, open to discussion, though no doubt it is the best we have at present. Personally, I think it is far too heavy and cumbrous, too conspicuous when moving in the open, too slow into action, and possessing an unnecessarily long range and an unnecessarily heavy shell. Whatever may be the merits of a 20lb. H.E. against frontier towers, it will surely not injure solid concrete any better than a 12lb. shell would, and as for range, 4500ˣ would appear to be sufficient, for all that is required is to outrange the machine gun. Were these conditions accepted, I imagine there would be no difficulty in designing a far lighter and handier weapon and in simplifying ammunition supply at the same time. Such a gun would hardly be less efficient as an anti-tank weapon than the 3·7″ how. is. Perhaps the provision of a special light shell would give sufficient m.v. without instability of carriage, to render it quite a good weapon for this purpose, and the objection to two types of ammunition would be less, if it were possible to carry more altogether.

Now before closing this subject, I would like to consider for a moment the question of what form of support the infantry really want. At present they are demanding smoke, and say that given

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that, they will manage the rest themselves. I have even heard one officer say that he wished that batteries would carry smoke shell up to 50% of their total ammunition. I do not propose to go through all the well-known objections to smoke, of which the most relevant to this discussion is the fact that it must be observed; but merely to content myself with wondering whether, as a war goes on, and the quality of the troops goes down, infantry will really like plunging into an impenetrable wall of smoke, which by its very existence is attracting a hail of machine-gun bullets; unaimed perhaps, but distinctly discouraging. Personally, I should hate it.

At the end of the last war a creeping barrage was always wanted; in the next, it may be dense rows of tanks that will be required; but I do not believe it will be smoke, and am inclined to pin my faith on an accurately placed concentration of killing projectiles, as the idea to be aimed at. These remarks obviously only apply to screening the actual infantry objective with smoke, and not to screening the attack from enemy on its flanks, which is useful and often very effective.

To sum up. The side which masters the communication problem, will have a winning advantage in the next war. Therefore, the less communication required the better. As far as artillery is concerned, the predicted concentration and the close up, close support gun seem to provide the best answer, and I picture a divisional artillery of the future consisting of, (a) very long range light and medium guns, and (b) very light and mobile close support guns; and if the latter could not be adapted to meet the case, a proportion of special anti-tank weapons for the defence of the forward areas.

There is not the space to discuss whether such weapons would meet all situations that might arise in battle, but if they could compete with the most difficult, they could probably be adapted to meet the easier; and the use of reduced charges would, I think, overcome most difficulties.

II. *Targets, and the application of tactics to practice camps.*

On the miniature range can be taught, orders, fire discipline, and rules of ranging, but not observation of fire or tactics. Therefore it seems a pity that so many targets engaged at practice camp provide nothing more than an exercise that can be done at home.

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I am familiar with the argument that practice camp is quite different from miniature range, and that an officer whose work on the latter is as near perfection as may be, will nevertheless often fail when handling real guns and real ammunition; and that targets, therefore, should be made as simple as possible. But keeping in view that the annual allowance of ammunition is very meagre, I cannot help thinking that it should not be used for teaching rules of ranging and fire discipline only, but that as far as possible, and without prejudice to the teaching of pure gunnery, it should be used to provide an exercise in what would actually have to be done in war, and that therefore targets and general conditions should be difficult, more often than not, and that the tactical side of the question should be made natural. "Instructions for Practice" say that a definite tactical problem should be set with each series, though not necessarily part of a continuous scheme; but what, in actual fact, does this amount to? An elaborate explanation is usually required to make a battery commander visualise an impossible situation, and even then, the chances that he will be able to see with the eyes of the visualiser, are small indeed. Or, at a given moment the word is passed for "Mr. Snooks to the O.P." Up goes Mr. Snooks, and looking out over a piece of ground for the first time, he is shown a target and told to take it on. Very likely he doesn't even know where his zero line lies on the ground, and unless he is blessed with an unusually efficient B.C.A. his difficulties are likely to be almost insuperable. And what of the target itself? Perhaps it may be a black and white screen, representing a machine gun, some 2000 yards away; and when was a machine gun ever seen in such conditions in real life?

I think it will be admitted that many things are done at practice camp, which have very little relation to what actually happens in war. It is true that at most camps, the ground, being very open, cannot provide practice in overcoming many of the difficulties that might be met with on service; there is bound to be a certain amount of make believe, particularly in camps of which TRAWSFYNYDD is a fair example, where restrictions to manœuvre involve another disadvantage; but why make more than is absolutely necessary? Better to improve what can be improved, and cut the rest out altogether.

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Now I want to make a few suggestions for bringing practice camps more into line with actual fact, and in order to make these suggestions clear, I propose to give as an example a short description of an imaginary day's practice. At the outset I would like to say that no attempt to make things more realistic need interfere in any way with the purely gunnery problem. The only difference will be that the target will be represented and pointed out in a rational manner, and that an attempt will be made to introduce the question of cause and effect. Possibly the targets may be occasionally rather harder to hit than heretofore.

The suggestions I want to put forward are as follows:—

(i) That each day's practice should be done on a continuous scheme.

(ii) That in all situations the whole of the artillery likely to be employed normally, should be in action, or in readiness, together; that it should be possible to site batteries in depth, as they would be in war, and to send F.O.O's and infantry well forward, and in the line of fire when necessary. This would involve the provision of rear protection for batteries and personnel in the forward areas, but at camps like Trawsfynydd, where available positions are already practically fixed by the nature of the ground, this would not produce any greater tactical unreality than exists at present.

(iii) That once a battery commander had been given his orders and his zone, targets should only be pointed out to him in a rational manner, i.e., by the infantry he is supporting, or by his brigade commander, probably by telephone. (To ensure this, it would be necessary for infantry to be present throughout practice). Otherwise a B.C. should be given discretion to engage any target appearing in his zone, as far as ammunition would allow.

(iv) That the ground, which need be of no great extent, should be prepared to provide, not only an exercise in a definite tactical problem, but such variations to that problem as might appear advisable as the result of the success or otherwise of the various shoots. By "prepared" I mean that money should be spent in making splinter-proofs for batteries, O.P's. etc., and in providing a large number of alternative targets, so

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that realistic situations can be produced at will, without involving long winded attempts to make others see with one's own eyes.

(v) That some responsible officer should be put in charge of the enemy, able to indicate hostile action by pulling up suitable targets, and by firing puffs, bombs, etc. A good place for him would be with a range officer, and he should be in communication with the director of practice. Before proceeding with the example, I might run through a list of the targets it might be desirable to introduce into a day's practice, with a few notes on the best way of representing them, and engaging them. Generally speaking all targets should be indicated by some sort of movement perhaps drawing attention to something else. This movement would either cease, or, in the case of genuine moving targets, alter, as soon as they were engaged. But to come to details.

1. *Shooting in on zero lines.*

2. *Registration of zones.*

Both provide exercise of technical and tactical value, and should therefore be carried out whenever the situation allows. No targets are required.

3. *Gun targets.*

These are often most unreal at present. They should usually be engaged by aerial observation, or as flash batteries (which is however and exercise of doubtful value, since anyone can range on a crest), or a portion of the target might sometimes be made visible to an F.O.O. The present method of indicating batteries by screens is suitable, provided that they are sited in likely places. They should not be made obvious, and attention should be directed to them by the firing of puffs or bombs.

4. *Trenches. Strong points. O.P's, etc.*

These should be made as inconspicuous as possible, and sited in likely tactical spots; trenches should seldom be straight. Infantry should also be considered as lining ditches, walls, or any natural feature, and their presence there, or in trenches, indicated by some sort of movement, some small fluttering objects are all that should be necessary.

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5. *Machine guns.*

The black and white screens usually used are ridiculous. Machine guns should be indicated by movement as in 4 above in a small area, or by an occasional puff which would draw attention to very small targets, only visible to an observer very close up.

6. *Infantry advancing or retiring.*

The present method of pulling up "jumpers" in succession and making them visible for definite times, though it provides a useful gymnastic exercise in gunnery, is most unrealistic. They should be arranged in small light groups, easily pulled up by one man, and should cover an area, appearing only in places where infantry would be likely to be visible, and appearing again and again for very short periods. The battery commander should be left to deal with them as he thinks fit.

7. *Tanks.*

The present method of representing tanks is good, provided that they adopt natural formations and restrict their movements to likely lines of approach.

The above should give a sufficient idea of what I am trying to urge, and I will now proceed to an example of the support of an attack by 1 brigade infantry, by 1 field brigade R.A., on a partially prepared position. The attached sketch is supposed to represent a piece of ground over which movement for wheels is practically restricted to the tracks.

Note.—Only those targets actually used are shown, but were the ground properly prepared, there would be many others which could be pulled up at will so as to vary the exercise. The position of our own infantry should also be indicated whenever possible by pulling up different coloured targets, though not usually anything so obviously conspicuous as red.

X_1 X_2 represents the line reached by forward infantry elements after an advanced guard action, about 3 hours before dark on the day (X - 1 day) preceding practice. A_1 A_2 etc., B_1 B_2 etc., represents a portion of a hostile position.

G.O.C. decides to attack the position from A_1 to A_2 at dawn on X day, and asks for, a predicted concentration for 10 minutes on A_1 and A_2 (A_3 he proposes to neutralize by machine gun fire) and a

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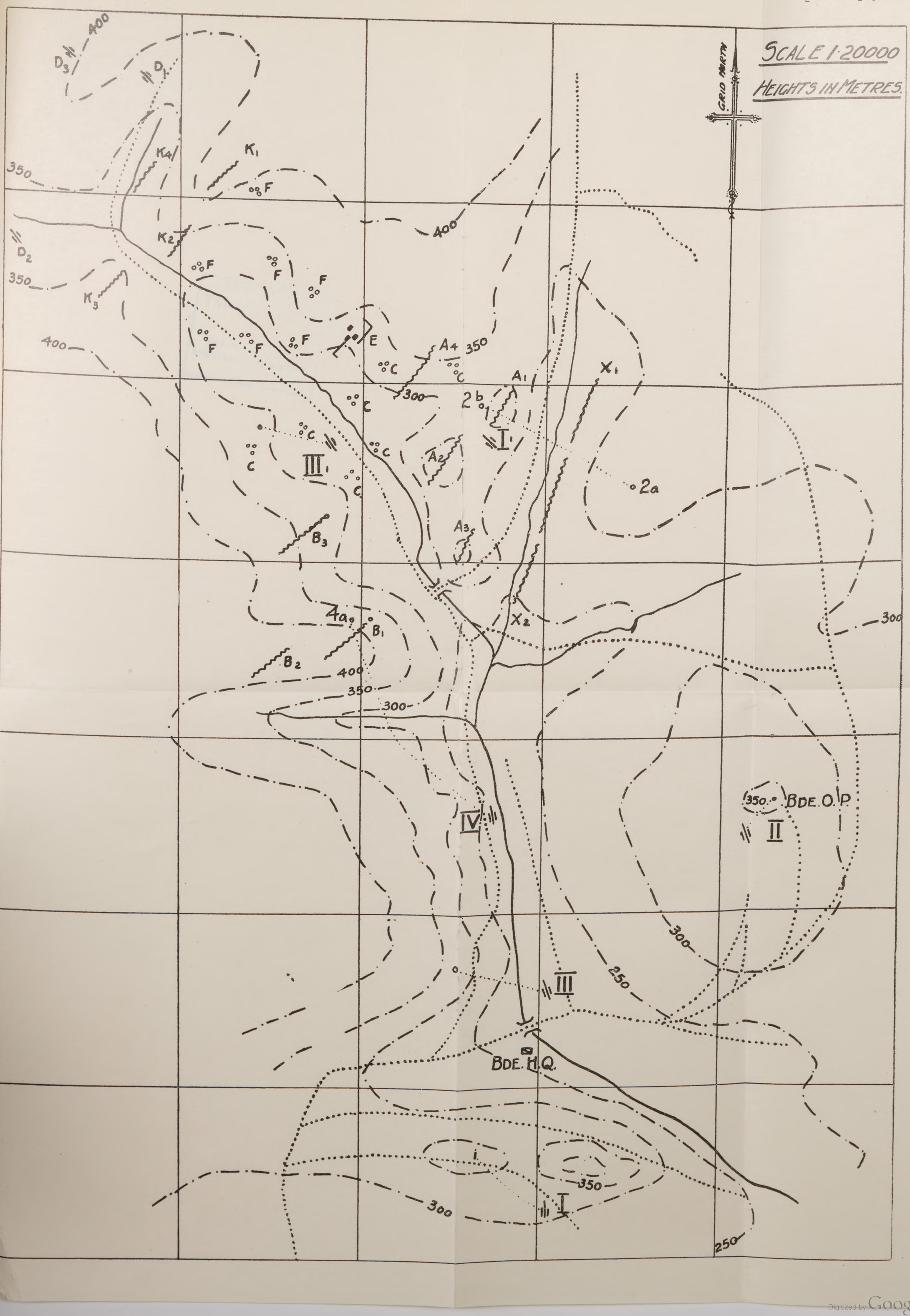
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A_1 and A_2 (A_3 he proposes to neutralize by machine gun fire) and a

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lift onto A_4 for 5 minutes. Also a smoke screen along the valley to cut off sector A from sector B.

First exercise (a). During evening (X - 1) day and night of X - 1/X day. Fixing of battery positions, O.P's and targets by any of the recognised survey methods; working out prediction calculations, etc., occupation of positions, and laying of communications.

Note.—Practically the only reconnaissance required will be in order to choose the most suitable of the already prepared battery and observation posts. They are shown on the sketch as I, II, IV, 18 pounders, and III 4·5″ how. IV has been detailed to answer calls from the air. II has a forward observation post at 2a using visual communication.

First exercise (b). Firing predicted concentrations and smoke screen at zero hour on X day.

Note.—No targets are required for this, the trench system can be represented by a few marks on the ground or by natural features if such are available.

If concentration is accurate and smoke screen is good, the attack may be taken as being successful, and exercise 2 proceeded with. If concentration is bad, attack fails, and must be reorganized, perhaps on a different part of the front. If smoke screen fails, enemy disclose machine guns at B_1 and B_3 which, unless dealt with by F.O.O. at 2a or by other means, cause the failure of the attack, which must be reorganized as before.

Second exercise (a) to be proceeded with when first has succeeded. Enemy are seen retiring at C C etc., and are engaged by batteries in whose zones they appear.

Second exercise (b). Hostile guns open fire from D_1 and D_2 and are engaged by battery IV with aerial observation.

During second exercise b F.O.O. at 2a pushes forward to 2b with telephone, leaving a transmitting station at 2a. Battery IV sends out an F.O.O. to 4a; and enemy machine guns open fire on our infantry in A_1 A_2 from some ruined buildings in E. These cannot be accurately located, but infantry get back information to brigade commander who details battery III to shell the area.

Second exercise (c). Battery III does this by any available means.

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Second exercise (d). Machine guns at E are spotted and engaged by F.OO's at 2b or 2a.

If either second exercise c or d are reasonably successful enemy retire and are seen at F F F and are engaged by batteries in whose zones they appear. If second exercise c or d both fail, F F F and C C C becomes a counter-attack, which is engaged by observed fire, or by any pre-arranged method.

Second exercise (e). If the counter-attack is not engaged and is therefore successful, our infantry retire from A_1 A_2, the F.O.O. at 2b is captured, and a new attack must be organized, or a defensive scheme and withdrawal can be carried out. But for the purposes of this example I will assume that either second exercise c or d were successful, or that the counter-attack was beaten off.

Third exercise (a). Batteries I and III receive orders to advance to I_1 and III_1 respectively, and do so.

Third exercise (b). During third exercise a while I and III are advancing, enemy movement is seen in a partially prepared position at K_1 K_2 K_3, and engaged by observed fire by batteries II and IV. Targets, short lengths of trench, walls, or other natural features.

Third exercise (c). Battery II or IV or both, register points in K_1 K_2 K_3. Note. Since their arrival at b_2 and d_1 F.O.O's should have been using all spare time fixing themselves and taking bearings or rays to all prominent points in enemy area.

Third exercise (d). Increased movement visible about K K K, and enemy battery opens fire from D_3, flashes are visible, drawing attention to, perhaps, one screen—engaged by battery IV through F.O.O., or perhaps by aerial observation.

Fourth exercise. A timed concentration on part of K K. predicted, or after previous registration.

And so on.—The scheme could be continued indefinitely, but enough has been written to convey the idea.

Before closing this subject it is necessary to consider whether such a scheme could be carried out otherwise than on paper, or whether it has any insuperable disadvantages. The following objections might be raised:—

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(i) That the available camp staff could not possibly compete with several batteries at once, that all days being brigade days, no account could be taken of drill, fire discipline, etc.

With regard to that. I have certainly suggested that all practice should be carried out "in brigade," but I now modify that to the extent of admitting that it would be better if each battery were to do one day pure gunnery practice, as at present, under the close supervision of the camp staff, who should otherwise concentrate on one or two batteries each day. There might be no harm in leaving the others to their own devices, and free from the attention of umpires, occasionally. The C.R.A. would, of course, direct operations, and be in a position to criticise the general handling of the batteries. For the rest, the presence of one competent recording clerk in each battery, should enable a fair idea to be obtained of the conduct of each series.

(ii) That the range officers could not possibly observe on so many targets, and that they would never know which was being fired at.

Without desiring to open up another subject which I do not propose to discuss here, I might hazard the opinion that detailed range reports are neither valuable, nor even necessary, for any series other than calibration, etc., or as a check on predicted shoots. For these, observations could easily be arranged. Otherwise an "O.C. Enemy" and two range officers should generally be able to give a fair idea of the success or otherwise of the shooting. As it is, range officers seldom move, and often send in reports from positions hardly more favourable for observing than that of the B.C. himself.

As regards the second part of the objection, a range officer would naturally expect fire to be directed against targets he had just disclosed, but apart from this, a simple method of lettering or numbering targets, and a telephone, should meet all requirements, e.g., "10th Battery about to engage target F."

(iii) That even with protection from the rear, there would still be too much danger to allow F.O.O's and infantry officers to go really close enough to the target. Shrapnel is perfectly safe. The discontinuance of the use of H.E. at practice, and the substitution of some innocuous projectile, giving a similar burst, in appearance, would remove this objection, and have sundry additional advantages, viz. :—

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It would enable a range officer, in the open, to get close to his target and give reliable observations, whenever accurate reports were really required.

It would remove the necessity for the presence of safety officers in each battery, so long as range officers were under cover.

There would be no "duds" to blow up afterwards.

It would probably be cheaper.

There is just one thing and that is that it would hardly be safe to fire over the heads of a battery on the move, and that being so, I see no alternative to making a pause while moving batteries were in the danger zone.

(iv) That the expense of preparing a range would be prohibitive, and even when prepared such a scheme would be impossible to stage manage.

Initial expense possibly might be big, but maintenance ought not to cost much. Targets need only be very small and light, and many could be operated from one dug-out. Provided that movement is continuous probably 3 or 4 dummies would be more visible than the long rows of motionless jumpers, in use to-day, often are. The ideal would be to have them electrically operated through buried cable. It would cost a lot to do, but should last years. The stage managing should cause no difficulty, particularly if it were no longer necessary to consider danger angles, etc. An intelligent O.C. Enemy, and efficient communication between him and the director of practice, should make everything quite easy; and the point is, that a failure would not necessarily matter; it might alter the order of practice slightly, but could not interrupt it. Even enemy make failures and do unexpected things at times, and it is to imitate the action of enemy that this scheme is designed.

Conclusion.

In reading through what I have written above I fear that I have hardly produced that atmosphere of gloom and evidence of a warped character promised at the beginning. I can only add that I indulged in several other reflections at TRAWSFYNYDD. Some of them I had committed to paper, but unfortunately they have proved too much for the Editor and so I can only suffer in silence.

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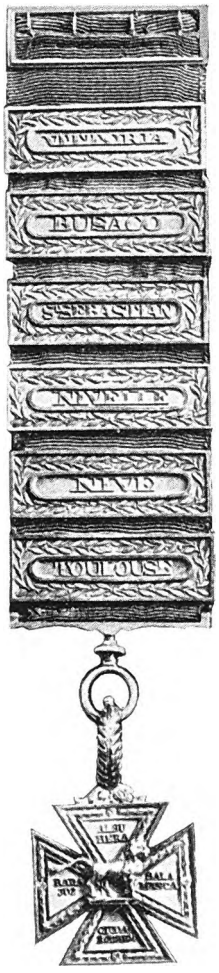

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THE GOLD CROSS, WITH 6 CLASPS,
awarded to
COLONEL SIR ALEXANDER DICKSON,
for services in the Peninsular War.

(See *The Journal of the Royal Artillery*, Vol. XXXII, pp.465-80.)

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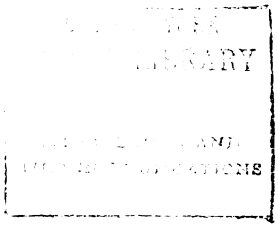

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MEDALS WHICH WERE AWARDED TO OFFICERS OF THE ROYAL REGIMENT OF ARTILLERY FOR SERVICE IN THE PENINSULAR WAR—1808 to 1814.

By Major (Bt. Lieut.-Colonel) J. H. Leslie, R.A. (retired list).

PRIOR to the year 1806 war medals, as we understand them now, were unknown. From that date until the conclusion of the Peninsular War in 1814, their award was *limited to Officers only*. In making a selection of Officers to whom medals should be granted, the choice of a commander of the Forces was restricted to the following ranks:—

General Officers.
Commanding Officers of Brigades.
Commanding Officers of Artillery and Engineers.
Adjutant-General and Quarter-Master-General.
D.A.-Generals, and A.Q.M.-Generals, having the rank of Field Officers, and being at the head of the staff with a detached Corps, or distinct Division of the Army.
Military Secretary, having the rank of Field Officer.
Commanding Officers of battalions, or corps equivalent thereto;[1] and officers who may have succeeded to the actual command during the engagement, in consequence of the death or removal of the original Commanding Officer.

The Regulations for the award of medals (*London Gazette* of 11 September, 1810, and of 9 October, 1813) laid down "that one medal[2] shall be borne by each officer recommended for such distinction," and "that for the second and third events, which may be subsequently commemorated in like manner," an officer should bear "a gold clasp attached to the ribbon to which the medal is suspended, and inscribed with the name of the battle or siege to which it relates."

[1] This included Officers of Artillery in actual command of "troops" of Horse Artillery, or "brigades" of guns, irrespective of their rank. The term "brigade" is synonymous with the "battery" of to-day.

[2] The name of the battle was engraved on the reverse of the medal.

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If a person became entitled to a fourth award, a gold cross was given "in substitution of the distinctions previously granted," with the name of one of the four battles engraved on each arm of the cross. Clasps were added on the ribbon of the cross as required.

Medals which would have been awarded to officers, had they not been killed in a battle or siege (or had since died), were transmitted to their families.

The medals were of gold, those for General officers being 2·1 inches in diameter, and those for other officers 1·3 inch, the name of the recipient being engraved on the rim.

The cross in design is that known as Maltese, 1·5 inch wide, with ornamental border: in the centre a lion *statant*, in relief. The back of the cross is the same as the front. The name of the recipient is engraved on the edges of the arms.

The clasps measure 2 inches by ·6 inch, and, within a border of laurel, is engraved the name of the battle, or siege, for which it was granted.

The ribbon—crimson with dark blue borders—is 1·75 inch wide.

During the whole of the Peninsular War—i.e. from 1808 to 1814—only 619 medals were awarded to officers of the British Army (including those serving in the Portuguese Army) for 18 different battles, actions, sieges, and captures of fortresses. Of this number, 48 (see List A) were conferred upon officers of the R.A.

One of the rules governing the award of medals was "that an Officer shall receive a medal only for a particular action, in which the corps to which he belongs has been engaged with musketry." For this reason officers of the cavalry at Busaco did not receive a medal, and in all Wellington's recommendations the rule was most rigidly adhered to.

For the capture of Ciudad Rodrigo in January, 1812, the medal was awarded for the storm only, i.e. for the assault and capture. The officers of the besieging and covering forces did not receive it, and none of the Head Quarters' Staff. Two Artillery officers only (Borthwick and Dickson) received it.

Writing to Lieut.-General Sir Stapleton Cotton, Bart., K.B., on 16 November, 1813, Wellington said that at the battle of Fuentes de Oñoro "there was a very heavy cannonade upon the troops, in which many were lost; but the officers of no corps were returned

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in the list for medals whose corps had not been engaged with musketry with the enemy. That is the rule, and I cannot depart from it." [Wellington's *Dispatches.* 1838. Vol. XI, pp. 294-5.]

It will thus be seen that to win a medal in the days of the Peninsular War was no easy matter.

In 1847 a *silver* general service medal, with clasps, was authorized (Horse Guards' General Order, dated 1 June, 1847) for conferment "upon every officer, non-commissioned officer and soldier of the army, who was present in any battle or siege," etc., etc., for which gold medals had previously been awarded.

The order applied only to men living in 1847, and *not* to relatives of those who had died. The qualification for the medal was not so stringent as for the original medal, in that the "engaged with musketry" condition was not enforced.

Nine Artillery officers, as shown in the footnotes of list A, received it, with clasps for battles, sieges, etc., at which they had been *present,* but whose "troop" or "brigade" had not been engaged with musketry; *or,* because their rank did not at that time entitle them to the gold medal.

The original medal rolls of claimants of the silver medal have been examined by me at the War Office. They are in bad condition, torn and damaged. They are generally headed:—

> "Return of officers now, or lately, serving in the Army whose claims to receive medals under the General Order of 1 June, 1847, have been examined and allowed, showing the regiments in which they formerly served and the battles or sieges referred to in the said order at which they were severally found to have been present."

These returns are signed by at least 4 General Officers, who were, apparently, specially appointed to check and verify claims. The work was most punctiliously carried out, as is seen from the remarks which were inserted when a claim was disallowed.

The following is given as an example. A veterinary-surgeon claimed clasps for Ciudad Rodrigo, Badajoz, Salamanca, Vittoria, San Sebastián, and Toulouse. The examining board remarked, "No duty could devolve on a veterinary surgeon at a siege, but Vet. Surg. —— served with the army at the periods of actions.

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Allow actions, disallow sieges." And so Ciudad Rodrigo, Badajoz, and San Sebastián were cut out.

In addition to the nine officers, as mentioned in the foot-notes of List A, the silver medal was awarded to 81 officers of the Royal Artillery. One (2nd Captain P. Faddy) received the naval general service medal with clasp for San Sebastián, having been serving in the Fleet.

List B gives the names of these officers.

List A.

Officers of the Royal Regiment of Artillery to whom gold crosses, medals and clasps were awarded during the Peninsular War—1808 to 1814—showing the Battles, Sieges, etc., for which they were awarded.

These are indicated by reference numbers which correspond with those given in the list of "Officers to whom Her Majesty has granted silver medals," published for the first time in the Official Monthly Army List of April, 1849.

2. Roleia.
3. Vimiera.
4. Sahagún and Benavente.
5. Corunna.
7. Talavera.
9. Busaco.
10. Barrosa.
11. Fuentes de Oñoro.
12. Albuera.
14. Ciudad Rodrigo.
15. Badajoz.
16. Salamanca.
18. Vittoria.
19. Pyrenees.
20. San Sebastián.
22. Nivelle.
24. Nive.
25. Orthes.
26. Toulouse.

It would be interesting if the present resting-place of these crosses and medals could be ascertained and placed upon record. Some are known, as here noted. Information as to others is desired.

Dickson, A. In the Museum of the R.A. Institution, Woolwich.
Frazer, A. S. In the collection of Colonel A. E. Whitaker.
Greene, W. ,, ,, ,, Messrs. Vickers, Ltd., Sheffield.
Robe, W. In the Museum of the R.A.I., Woolwich.
,, , W. L. ,, ,, ,,
Sillery, C. D. The property of a descendant of C. D. Sillery.

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GUNNER THOMAS ROLLAND'S SILVER MEDAL, WITH 13 CLASPS, FOR SERVICE IN THE PENINSULAR WAR, 1808 TO 1814.

He belonged to Captain Robert Lawson's company, 8th battalion, R.A., now (1925) 87th Field Battery, R.A., the only R.A. unit which served in the Peninsula *throughout* the war.

The medal is the property of the R.A. Institution, and was purchased in March, 1895, for £23-10.

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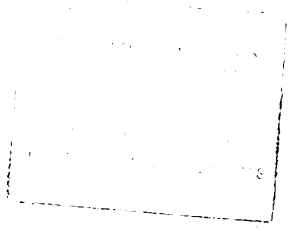

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NAME.	No. in List of R.A. Officers.	Rank at time of 1st award.	Award.	Battles, sieges, etc.
Baynes, H. ...	1092	2nd Capt.	Medal.	7.
Bean, G.	914	Captain	,, 1 clasp	18. 25.
Borthwick, W. ...	552	Maj.-Gen.	Large medal	14.
Brandreth, T. A.	990	Captain	Medal. 1 clasp	19. 26.
Buckner, R. ...	746	Major	,, 2 clasps	18. 20. 22.
Bull, R.	845	Captain	,, ,,	9. 11. 16.
Cairnes, R. ...	1106	2nd Capt.	,, 1 clasp	18. 19.
Carmichael, L. ...	1007	Captain	,,	24.
Carncross, J. H.	727	Major	Cross. 2 clasps	16. 18. 19. 22. 24. 25.
Dickson, A. ...	844	Captain (k)	,, 6 ,,	9. 12. 14. 15. 16. 18. 20. 22. 24. 26.
Douglas R. ...	958	,,	,,	16. 18. 19. 22. (a)
Downman, T. ...	742	Major	Medal.	16. (b)
Du Bourdieu, S....	1001	Captain	,,	18.
Duncan, A. ...	740	Major	,,	10.
Dyer J.	751	,,	Cross. 1 clasp	19. 20. 24. 25. 26.
Eliot, W. G. ...	971	2nd Capt.	Medal.	3. (c)
Framingham, H.	624	Lieut.-Col.	Cross. 1 clasp	7. 9. 11. 15. 16
Frazer, A. S. ...	765	Captain	,, ,,	18. 20. 22. 24. .26.
Gardiner, R. W....	979	,,	,, 2 clasps	10. 15. 16. 18. 25. 26. (d)
Greene, W. ...	1105	2nd Capt.	Medal. (n)	16.
Harding, J. ...	542	Colonel	,,	5.
Hawker, J. ...	771	Captain	,,	12.
Holcombe, H. F.	895	,,	,,	15.
Howorth, E. ...	484	Colonel	Large medal. 2 clasps	7. 9. 11.
Hughes, P. J. ...	915	Captain	Medal.	10.
Jenkinson, G. ...	1032	2nd Capt.	,,	25.
Lane, H. B. ...	1062	,,	,,	26.
Lawson, R. ...	943	Captain	Cross. 1 clasp	7. 9. 11. 16. 18.
Macdonald, R. ...	858	,,	Medal.	16.
Maxwell, S. ...	966	,,	,, 2 clasps	18. 24. 25.
May, J.	883	,,	Cross. 3 ,,	15. 16. 18. 20. 22. 24. 26.
Michell, C. C. ...	1486	1st Lieut. (k)	Medal. 1 clasp	18. 26. (e)
Michell, J. ...	1004	Captain	,, ,,	25. 26 (f)
Morrison, W. ...	934	,,	Medal.	3.
Mosse, C.... ...	1101	2nd Capt.	,,	24.
Parker, J. B. ...	1117	,,	,,	18. (g)
Ramsay W. N. ...	1019	,,	,, 1 clasp	18. 24.
Raynsford, R. T.	809	Captain	Medal.	3.
Robe, W.... ...	654	Lieut.-Col.	Cross. 1 clasp	3. 7. 9. 15. 16.
Robe, W. L. ...	1390	1st Lieut.	Medal. ,,	22. 24.
Roberts, W. ...	928	Captain	Medal.	10.
Ross, H. D. ...	890	,,	Cross. 2 clasps	9. 15. 16. 17. 22. 24. (h)
Sillery, C. D. ...	827	,,	Medal.	7.
Smith, J. W. ...	877	,,	,, 1 clasp	18. 20. (i)
Tulloh, A. ..	801	,, (k)	Cross.	15. 18. 22. 24.
Turner, G, ...	974	,,	Medal. 1 clasp	25. 26.
Viney, J.... ...	685	Major	,, ,,	2 & 3. (j). 5.
Wilmot. E. ...	912	Captain	Medal.	5.

Silver Medal was awarded in 1847 with clasps for

[a] 20.
[b] 4. 5. 14.
[c] 2. 3. 7.
[d] 2. 3. 7.
[e] 15.
[f] 15.
[g] 18. 20. 25. 26.
[h] 11. 14. 19.
[i] 22. 24.

[j] Reckoned as one battle.
[k] Serving in the Portuguese Artillery.

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List B.

Officers of the Royal Regiment of Artillery to whom the silver General-service medal was awarded in 1847, for service in the Peninsular War.

Name.	No. in List of R.A. Officers.	Rank at time of 1st award.	Battles, Sieges, &c.
Arbuthnott, The Hon. W.	1217	1st Lieut.	7. 9.
Barttelot, G. [e] ...	1299	,,	9. 11. 14. 15. 16.
Bayly F.	1473	2nd ,,	9.
Baynes, G. M.	914	1st ,,	19. 22. 26.
Bedingfield F.	1087	2nd Capt.	10.
Bell, W.	1242	1st Lieut.	22. 24. 26.
Belson, G. J.	1235	,,	9. 11. 14. 15. 18. 19. 22. 24. 25.
Bent, W. H.	1449	2nd Lieut.	12. 15.
Blachley, C.	1171	1st ,,	9. 11. 16.
,, H.	1221	,,	16. 18. 20. 22. 24.
Bloomfield, J.	1516	2nd ,,	18. 20. 22. 24. 25. 26.
Bourchier, D. M. ...	1166	1st ,,	9. 14. 15.
Brereton, W.	1258	,,	10. 18. 19. 20. 25. 26.
Bridges, E. J.	1438	,,	18. 19. 22. 24.
Campbell, P.	879	Captain	7.
Carter, T.	1220	1st Lieut.	9.
Cater, T. O.	1465	2nd ,,	10.
Cator, W.	1134	2nd Capt.	10.
Chester, J.	1010	,,	4. (Benavente only).
Cox, T. [a]	1349	1st Lieut.	5. 15.
Dansey, C. C.	1138	2nd Capt.	15. 16. 17. 20. 22. 24.
Darby, J.	1126	1st Lieut.	5.
Deacon, C. P.	1124	2nd Capt.	20.
Dundas, W. B.	1150	,,	14. 15.
Dunn, W.	1188	1st Lieut.	9. 12.
Dyneley, T.	1114	2nd Capt.	14. 16. 18. 19.
Edwardes, D. J. ...	1297	1st Lieut.	18. 20. 22. 24.
Elgee, W.	1384	,,	7. 11.
England, P. V. ...	1261	,,	18. 22.
Evelegh, H.	747	Captain	4.
Eyre, J.	1381	1st Lieut.	5.
Faddy, P.	1157	2nd Capt.	20. [c]
Ford, G.	1550	2nd Lieut.	26.
Forster, H.	1329	1st ,,	4. 5.
Furneaux, W.	1455	,,	14.
Gordon, C. E.	1162	2nd Capt.	20. 22. 24. 25.
Graham, R. C.	1312	1st Lieut.	2. 3. 5.
Greatley, T. W. ...	1080	2nd Capt.	4. 5.
Grimes, R. [d]	1462	2nd Lieut.	14. 15.
Harding, R.	1322	1st ,,	16. 18. 20. 25. 26.
Hardinge, R.	1318	,,	18. 20. 25. 26.
Hunt, R. B.	1155	2nd Capt.	15.
Ingilby, W. B.	1464	2nd Lieut.	9. 11. 14. 16.
James, G.	1503	,,	18. 19. 22. 25.
Leathes, R. M.	1268	1st ,,	5.
Lempriere, W. C. ...	1205	,,	4. 5.
Lindsay, W. F. [b] ...	1185	,,	11.

[a] Serving in Portuguese Army. [b] Naval General Service Medal.
[c] Assumed the additional surname 'Carnegie' in 1816.
[d] Assumed the surname 'Cholmley' instead of Grimes, in 185?.
[e] Whilst serving in the R.A. his surname was Barttelot-Smyth, but on the death of his Father in 1837, he relinquished the name Smyth, which had been assumed by his Father. Consequently when the medal was awarded, his surname was Barttelot only.

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Name.	No. in List of R.A. Officers.	Rank at time of 1st award.	Battles, Sieges, &c.
Litchfield, R.	1453	1st Lieut.	18. 25. 26.
Lock, W. E.	1338	,,	2. 3.
Love, J.	1489	2nd ,,	14. 15. 16.
Louis, M.	1244	1st ,,	18. 20. 22. 24.
Macbean, A.	1529	2nd ,,	18. 20. 22. 24.
Macbean, F.	1228	1st ,,	5.
MacDonald, A.	1174	,,	9. 11. 16. 18. 19. 20. 25. 26.
MacLeod, H. G. ...	1392	,,	7. 9.
Manners, C.	1397	,,	10.
Monro, F.	1598	2nd ,,	16. 18. 22. 24.
Moor, H. R.	1176	1st ,,	9. 11. 14. 15. 16.
Morgan, E.	1558	2nd ,,	26.
Morgan, H.	1459	1st ,,	19. 20. 26.
Newland R.	1229	,,	16. 18. 25. 26.
Palliser, H.	1523	2nd ,,	18. 20. 25. 26.
Parratt, H. M.	1445	1st ,,	20. 22. 24. 25. 26.
Pascoe, J.	1415	2nd ,,	9. 15. 16. 18. 20. 22. 24
Pester, H.	1470	,,	10.
Phillips, R. F.	1353	,,	16. 18. 19. 20. 22.
Power, W. G.	1074	2nd Capt.	7. 14. 15. 16. 19. 20. 22. 24.
Powers, J.	36	Qr.-Master	5.
Raynes, W. A.	1313	1st Lieut.	5. 10. 18. 19. 22. 24.
Shaw, C....	1468	,,	20. 22. 24.
Sinclair, J.	1207	,,	5. 15. 16. 18. 20. 22. 24.
Swabey, W.	1327	,,	14. 16. 18.
Story, R. W.	1488	,,	20.
Townshend, J.	1456	,,	22. 24.
Tweedie, M.	1471	,,	26.
Whinyates, E. C. ...	1002	2nd Capt.	9. 12.
Willis, G. B.	1420	1st Lieut.	15.
Wood, J. H.	1281	,,	18. 19. 20. 22. 25. 26.
Woolcombe, R. ...	1325	,,	11.
Wright, F.	1280	,,	5.

1st Lieutenant Henry Finlay Cubitt (1310) was entitled to the silver Medal with 4 clasps—Vittoria, Pyrenees, Orthes, and Toulouse. He died on 12 August, 1848.

1st Lieutenant Thomas Newton-King (1346) was entitled to it, with clasp for Corunna. He died on 8 May, 1854.

Their names are not included in the list, and it is assumed that they did not apply for the medal.

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ESSAY ON ANTI-TANK DEFENCE. *

By Capitaine Perré.

(Translated by Brig-Genl. W. Evans, C.M.G., D.S.O.)

PART II.

(2) *Rifles and machine-guns.* The Germans employed: ordinary rifles and machine guns, and finally an anti-tank rifle of large bore; a machine-gun of the same bore was manufactured but was not used during the war.

(a) *Ordinary rifles and machine-guns.* As soon as tanks made their appearance the Germans made use of the armour-piercing bullets (S.M.K.) with steel cores in leaden envelopes which had been constructed for use against trench shields. This ammunition met with a measure of success against the lightly armoured English tanks but was quite powerless against the heavily armoured Schneider, the Saint-Chamond and the Renault. The Germans then recommended their infantry to fire at the observation ports of the tank. They gave very thorough instructions on this point; sketches were prepared to show where the ports were in each nature of tank; and in camps behind the lines musketry practice was carried out against silhouettes of tanks on which the ports were shown. Fire on the ports is capable of causing casualties to the crews. Drivers and layers were wounded in the face and some blinded. These wounds which resembled blue tattoo marks appeared to result from splashes of melted lead, caused by the bimetallic bullet breaking up against the edges of the ports. The ordinary German rifle bullet (lead in German silver) would thus give the same result as the steel cored bullet. On the other hand, our mono-metallic bullet would seem to be less efficient. Direct hits in the face from fire at the ports were rare.

* "Essai sur la défense contre les chars" (II)—*Revue Militaire Française*, May, 1924.

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This fire demands great coolness, as it can only be effective at short ranges; we never experienced it except in attacks where tanks had to work in wooded country, or on ground very much cut up (such as the fight at Grivesnes Park, 7 April, 1918; Senecat Wood, 18 April, 1918; Forest of Retz, June, 1918 . . .) and only then when we were faced by troops of the very best quality such as the Alpine Corps on 18 April, 1918.

(b) *Special types of rifle and machine-gun.* The Germans, finding ordinary fire-arms powerless, produced a special weapon.

The anti-tank rifle (Tankgewehr) is a long rifle of the Mauser type.

Its calibre is 13$^{m/m}$.
,, weight ,, 18 kilos.

It is provided with the mounting of the 08-15 machine-gun and is served by three men. The bullet is steel-cored and is effective up to 400 metres. The best range is 200 metres, but even so the bullet to penetrate should strike the armour nearly at right angles. The German Command appear to have set great store by this weapon. 4000 of them were issued. 3 were issued to each regiment and formed part of the "minenwerfer" companies. This weapon met with no success. Very few tanks were hit by them and we collected numbers of them abandoned in the battle-zone. The Germans themselves were forced to recognise the dislike their men had of serving this weapon. "Arms of defence existed, but many were abandoned in their positions" (General Schwarte in *Die Militärischen Lehren des Grossen Krieges*). Our enemy, when he based his hopes on this weapon had made the mistake of underestimating the moral effect of tanks. This is odd as at first they appear to have fully realised it: "The moral effect of tanks on the infantry is very great" (27th Division, April, 1917).

Man does not fight for fighting's sake, he fights to win, that is to say, to kill without being himself killed. The average soldier does not fight with confidence and tenacity unless he feels that he at least has as good a chance as his adversary. The man firing the anti-tank rifle, much impressed by the armour and seeming invulnerability of his opponent, feels from the first at a disadvantage; he is inclined to open fire much too soon. As the tank advances he

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becomes nervous . . . . and finally gives up the uneven contest. This must generally be the case with any weapon which does not give a man in the open a good chance of stopping a tank with one direct hit before it becomes too great a menace. The moral effect of tanks is very great, and this moral effect is not diminished as men become accustomed to meeting them; the nerves of German troops who had been engaged against tanks on several occasions did not harden with experience. This must be taken into consideration. It is no use in indulging in recriminations, or merely saying as does Ludendorff "Fighting tanks is a question of nerve." This is true, but one must not ask more of human beings than their nerve can stand.

Anti-tank machine-guns (Tuf-Tank und Flieger). The Germans had produced a machine-gun of big calibre to be used against tanks and low-flying aeroplanes by October, 1918, but events prevented it ever being used. The specifications of this weapon were as follows:—

Calibre: 13$^{m/m}$ (the same as the anti-tank rifle).
Maximum rate of fire: 300 rounds a minute.
Very low trajectory, m.v. 800 metres.
Dispersion similar to the 08 machine-gun.
Mechanism (excepting brake) do.
The gun is always fired on wheels but the carriage can be lowered to enable it to be fired by a man in a lying position.
Weight of bullet: about 50 grammes.

Natures of ammunition (3):—
"Normal Geschoss"—steel core in leaden sleeve, envelope of German silver.
"P.R. Geschoss"—incendiary bullet.
"L. Spur Geschoss"—tracer bullet (the object being to destroy the moral of the tank crew by showing them the danger).

Penetration of bullets at an angle of incidence less than 20°:—
At 100 metres: 20 to 25$^{m/m}$ of steel.
,, 500 ,, 18 to 20$^{m/m}$,,
At an angle of incidence over 20° the bullets glance off . . . .

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As this weapon can only seriously cripple a tank by firing bursts of say 30 rounds, it has no great advantage over a gun in the weight of ammunition carried, and though as bulky as a light gun, has the disadvantage in range. One is inclined to think that a sufficiently light and powerful accompanying gun, capable of commencing fire at 1000 m. (which appears a reasonable proposition) would be preferable. However this is controversial and can only be settled by experiment. Anyhow the machine-gun "Tuf" cannot be considered as being on the same footing as the other infantry weapons (rifles, Lewis guns, machine-guns) and must be used more or less as a gun. Rumour has it that the Germans were trying to produce a rifle and a machine-gun of normal bore, with very high penetration. If these weapons are effective at sufficient range, and actually come into being they will have to be taken into account as they will completely alter the problem of anti-tank defence. But there is no necessity here to go into such vague conjectures.

(3) *Grenades.* The Germans instructed their infantry to fasten 5 grenades together *(Geballte Ladung)* to be thrown on to the roof of the tank. This method practicable with the Schneider which has a flat roof, is no use against Renault tanks.

* * * * * * * *

The few casualties sustained by our tanks from grenades took place in wooded or very close country (Senecat wood, Forest of Retz . . .). One is therefore justified in concluding, as did the Germans, that in the majority of natures of ground the employment of grenades against tanks will be exceptional.

(4) *Flammenwerfer.* The Germans proposed using these in certain natures of country or in defiles, the flame being directed against the ports. We do not know an example of a tank being destroyed by them. On account of their very short range they could only be used in very close country.

MINE-FIELDS.

It is claimed that land mines form an efficient defence. There are two kinds:—

(1) *Buried,* usually consisting of trench mortar bombs fused so that the weight of a tank explodes them;

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(2) *Improvised mine-fields,* formed by sowing the ground with small egg-shaped bombs.

(1) Buried mine-fields entail a great deal of labour, they are difficult to conceal and fairly easily located from aerial photographs. . . . . Before the American offensive of September 26, 1918, the majority of mine-fields were located and maps showing their positions were issued to tank units.

Perhaps field artillery could cut lanes through mine-fields, as they do through wire entanglements. One great disadvantage of mine-fields is that they necessitate minute precautions against accidents. (On September 26 our tanks came up against mine-fields still surrounded with notices: "Achtung, Minenfeld!") For these reasons it would seem that buried mines should only be used in restricted areas, where the nature of the ground prevents tanks from coming under the fire of anti-tank weapons.

(2) *Improvised mine-fields cannot be considered to be complete obstacles.* Tank-crews can see bombs on the ground; and they only cause a diminution in the pace of tanks. We may add that mines can be prematurely exploded by apparatus like the rolling mine exploders used by the English during the war.

From the study of the various means of defence we arrive at this conclusion: The Germans were always trying to find some panacea which should kill the new weapon at birth. . . . If one could visualise the fight between tank and anti-tank weapon as a duel, doubtless one could find an absolute antidote against tanks. As a tank however is only used in conjunction with the combined action of the other arms the problem of anti-tank defence becomes complicated. All the weapons have their drawbacks and it is only by their judicious combination that we can hope to ensure the defence of a position. Good organisation must make up for the imperfection of weapons. We will now study this organisation and combination of the means of defence:—

I. Anti-tank defence on a main line of resistance.

Brief résumé of method of using tanks in the attack of a position.

Before attacking an organised position, where troops are in contact, tanks carry out, usually by night, an approach march to their positions of readiness, then on to their jumping-off places.

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At zero hour the tanks debouch simultaneously on a wide front from their jumping-off place, and either place themselves deployed in front of the infantry front line, or follow it up semi-deployed or in small columns ready to act when necessary. The tanks in support proceed by bounds alongside of or behind the battalions in support, moving semi-deployed or in small columns as the ground permits.

They carry out the attack:—

(1) In close touch with the infantry;
(2) in mass on a wide front; and
(3) in depth.

ORGANISATION OF THE DEFENCE.

The organisation of the defence should aim at:—

(1) Separating the infantry from tanks.
(2) Confronting tanks with a continuous defence.
(3) Defence in depth.

The first of these steps is necessary as we have not at present an infantry arm capable of dealing with tanks in all natures of ground. . . . Only in villages, woods, ground prepared with artificial obstacles, where the speed of tanks is reduced can the infantry deal with tanks with their own weapons. . . . We can expect the infantry to stop the enemy infantry following up the tanks, but this entails certain consequences, one of which is that once the hostile tanks have penetrated our front line, our artillery cannot fire at them without hitting our own infantry. . . .

Continuity—realised by dividing the front into zones blocked by obstacles, zones where infantry can fight tanks, or zones where defence by special weapons is organised.

Depth. Defence in depth has to be organised both to prevent casualties from the enemy's fire, and to resist the successive attempts of tanks disposed in depth, which would without doubt get through linear barrages. How far should this depth extend? Obviously the complete depth of the zone of resistance, as it is necesary to protect the infantry disposed there against tanks. But further back? Here the conduct of the infantry must guide us. When the enemy has penetrated deeply into the position of resistance, every

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effort must be made to hold on to the rearmost limit of this position to prevent the enemy from getting into the line of guns. The foremost batteries of the field artillery ought to be able usually by moving guns or sections partly to undertake this task. Such guns ought to get good results, as they will usually commence firing at the moment when the enemy infantry and tanks have just crossed the crests covering the artillery of the defence, i.e., the moment when their own artillery ceases to support them by observed fire.

A good example is furnished by the counter-attack of June 11, 1918. Up to a certain crest the tanks had no losses; directly they passed this line the tanks were engaged by guns firing direct from four different areas, and suffered severe casualties (40% of effectives). These guns situated 3 to 4 kilos. behind the enemy front line belonged to the foremost batteries of his main gun positions, and their exceptional effect seems to be due to the fact that our artillery from now on could not support the tanks with observed fire. When it appears likely that a break through of a front will occur, guns taken from the advanced positions will form the skeleton of a line of protection for the artillery. When this break through is imminent or has succeeded at certain points, it will be necessary to strengthen this protection; now one cannot do this by continuing to take guns away from the batteries firing from cover, as this would be playing the enemy's game and disorganising the programme of artillery fire at the moment when it is all the more necessary as the infantry fire decreases. And so we see the necessity for *mobile anti-tank defence* units . . . . this necessity soon became apparent during the war. At Cambrai (November, 1917), German anti-aircraft artillery (Flak) fulfilled this rôle, not without success; but it is obvious that anti-aircraft guns are not normally available as they have their own work to do. German Combined Training tells off mobile reserves of trench mortars, anti-tank machine-guns, and above all of field guns. This need for mobile reserves was quite realised by the French command. In 1918 experiments were carried out with trench mortars mounted on caterpillars.

The advantage of arming tanks with a sufficiently powerful gun was also realised. In May, 1918, the 1st Army fearing a German attack with tanks on its front proposed using two groups of St. Chamond. This tank carrying a 75 gun firing armour-piercing shell

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was eminently adapted for this task. The system of defence was organised, but the attack did not materialise.

ALLOTMENT OF TASKS TO THE VARIOUS MEANS OF DEFENCE.

I have just sketched the principles which should govern the organisation of the defence; further back I gave the characteristics of each weapon; we can now make a plan for the defence of a main line of resistance against tank attacks.

(1) The tracing of a line of resistance makes use of natural obstacles as far as possible.

(2) Zones protected by impassable obstacles, produce quiet areas immediately behind such obstacles but further back action by tanks which have got round with the help of infantry must be expected.

(3) In very close or wooded country where the advance of tanks is slow and difficult infantry can fight tanks with their own weapons (rifles and machine-guns firing at the ports, 3·7 guns, special grenades, and finally "flammenwerfer").

(4) In ground favourable to tanks:—

(a) The infantry by fire action stops the enemy infantry and separates it from the tanks. It tries to escape the notice of tanks and if necessary and the situation of the hostile infantry admits of it, ceases fire for the time being. A combat group only joins issue with a tank when it has been located and is being engaged by it. Then it utilises fire action against the ports, and special grenades.

(b) The artillery (firing from behind cover), engages tanks during their assembly and their approach march. At the commencement of the attack it participates in the anti-tank fight by putting down barrages in front of the zone immediately beyond the position. During the attack heavy howitzer batteries, either with ground or air observation, engage second line tank units during their approach.

(c) Artificial obstacles and improvised mine-fields are developed as far as possible. They are useful in that they prevent a surprise attack by tanks.

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(d) Buried mine-fields are prepared in zones where the nature of the ground prevents the use of weapons firing direct.

(e) Weapons of defence firing direct are divided between strong points and mobile reserve.

(f) The strong points (armed with guns, anti-tank machine-guns) are distributed in depth throughout the position, so as to establish a continuous and deep zone of fire. Gun emplacements should be sought for in places from which wide fields of fire can be obtained. Flanking fire should be organised for the machine-guns. Alternative positions, lightly protected, or not protected at all, but camouflaged, are preferable to single strongly fortified emplacements. The greatest possible number of weapons should be able to bring fire to bear on the zone just outside the position.

(g) The arrangement of the fire system is continued back by the advanced field batteries. Directly a deep incursion of tanks occurs, they rapidly detach single guns or sections to form the framework of a line of defence for the artillery. The other guns continue their detailed tasks.

(h) Mobile elements (mechanically propelled guns, heavy tanks, field batteries) are placed in positions of readiness and instructed as to their procedure under certain circumstances. In case of a deep incursion of tanks they engage them over open sights to prevent their penetrating the artillery positions. Preferably they come into action 800-1000 m. behind a crest, and engage the tanks as they come over it. The field batteries allotted to the mobile defence can be used for other tasks that can be carried out from near their positions of readiness, their teams being kept close to the positions.

ORGANISATION OF THE COMMAND.

The preparation, organisation, and the co-ordination of the defence demand a commander. The Germans at first put anti-tank weapons under battalion commanders, but as the means of defence became more numerous and varied, they appointed an anti-tank defence commander. This commander should belong to the cadre of the division and should be with the divisional commander and

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work with him on the same lines as the C.R.A. This system removes the anti-tank weapons from the authority of the infantry commanders in the sectors in which they happen to be. This is a disadvantage, but it is necessary. To get the best value from the weapons now actually in our possession we consider it necessary for our infantry to aim at separating the tanks from their infantry; this brings about two distinct combats; the fight against infantry and the fight against tanks. These two fights are going on at the same time and on the same ground, they naturally support one another, their combined action is arranged from behind by the divisional commander, in front by liaison between the units concerned. They are nevertheless distinct. Now our Infantry Training lays down that a section of machine-guns placed in the zone of an infantry company and having the same tasks, need not necessarily be under the company commander. It seems much more reasonable that an anti-tank weapon with its own distinct task should not be under the command of a battalion commander. . . .

WEAPONS.

In the present state of our armament, the only weapon at our disposal for strong points, and for the mobile reserve, is the 75 belonging to the divisional artillery. A gun placed in a nest of resistance fires through an arc of 90°. If we imagine a division defending a front of 4000 metres, and a forward line of anti-tank guns from 300 to 500 metres from the front of the battle zone we should require 4 guns—say one battery. A second battery will be required to establish a second échelon . . . . and a third battery in reserve will constitute the mobile reserve. Thus, where conditions are unfavourable (as I have not taken into consideration the passive zones behind obstacles and zones where infantry can fight unaided) a whole group has to be found by the divisional artillery. This entails very hard work and it can readily be understood how necessary it is to lighten it. I do not propose here to enter into the question of the improvement of our anti-tank weapons. It will suffice to note the advantages to be gained by the possession of a sufficiently powerful infantry accompanying gun. . . . . tanks more powerfully armed than the Renault would be eminently suited to belong to the mobile reserve.

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II. Anti-tank defence of an outpost line.

An advance guard position may be held in many ways :—

(a) In a period of stabilisation and when a general attack by the enemy does not seem probable, the position may be strongly held and thus form a line of resistance with the object of preventing the enemy from gaining ground by making partial attacks.

(b) The outposts may be very weak, merely consisting of observation patrols who have orders to fall back before a hostile attack after warning the position of resistance.

(c) Outposts may have "to meet the enemy with a limited resistance, delay him everywhere, and disengage themselves in time to fall back on the position of resistance, it is preferable that they should be disposed in a number of posts." *(Provisional Infantry Training, February 1, 1920.)*

(d) On the other hand their task may be "to hold on to the end after the observation posts have been driven in; strong points are held by troops well dug in. The distance between these strong points may be such that it may not always be possible to obtain an entirely continuous zone of fire." *(Provisional Infantry Training.)*

(A) *An outpost line reinforced during static warfare.*

The outpost line here becomes an actual position of resistance, and its defence should be arranged for as such. There will always be certain modifications dependent on the special nature of the attacks to be expected on a position of this kind. The enemy might in fact (1) either attempt to take it by partial attacks; or (2) to take it by surprise. In consequence it will be necessary (1) while trying to realise a continuous barrage from strong points to sacrifice defence in depth in certain places, in order to organise it on the zones liable to partial attacks, and (2) to develop to the utmost obstacles and mine-fields though the proximity of the enemy will make this very difficult.

(B) *Outposts that are merely observation patrols.*

The question of anti-tank defence does not come in.

(C) *Outposts having to put up a limited resistance.*

Here one great difficulty arises. The weapons for use in strong points are 75 guns and it is not likely that these could be withdrawn to the line of resistance. The command naturally would not wish

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to sacrifice these weapons. Under these circumstances it would seem advisable if the ground permits, to make use of them in strong points firing at longer ranges (1200 metres and over). These points would be placed either in the front of the line of resistance, or the interval between the two positions. . . . Wherever the ground does not admit of this procedure obstacles or improvised mine-fields would be necessary to retard the advance of tanks. It cannot be denied that with our present armament tanks will always make the task of limited resistance by the outpost line most difficult.

(D) *Outposts who have instructions to resist to the last.*

Here the infantry are grouped in strong points. The front and flanks of these must be protected against tanks. In the case of natural "*points d'appui*" (woods, villages) the defence of the front can be left to the infantry. Moreover, tanks do not usually attempt to penetrate defended localities; they attempt to neutralise the outlying defences and get round them. Towards the end of the war the Germans had, under the name of "anti-tank forts" organised certain natural *points d'appui* in the intermediate zones, where they carried out a combat very much on the lines of outpost line fighting. The village of Cheppy (in the American attack of September 26, 1918) was an instance. The defence of strong points must be arranged for either by having nests of resistance manned in the defended localities themselves, or by having strong points established behind the advanced position. . . .

III. Anti-tank defence in breaking off the fight, or fighting in retreat.

In breaking off a fight the organisation of anti-tank defence of the rearguard position presents much the same problem as that of an outpost line furnishing a limited degree of resistance, only that here the solution is easier. . . . As the retreat continues the danger grows less from tanks . The present day tanks cannot carry out long marches by road, but have to be carried by train or special lorries (of which very few exist); destruction of roads and means of communication will hamper their advance. There will no longer be anything to fear except from small tank units operating on narrow fronts. Fixed nests of resistance will disappear and defensive measures will be confined to mobile elements which will be brought

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into action behind fronts where tanks may be expected. Artillery under cover with ground or air observation will deal with tanks when detraining and in their approach march; occasionally it will be able to engage tanks moving forward to the attack on a narrow front.

In an action in retreat the defence will aim at checking the enemy and forcing him to deploy by the use of successive curtains of fire. . . . The enemy by pushing forward a portion of the advanced guard supported by small numbers of tanks may penetrate these barrages . . . . mobile defences and artillery firing indirect should be sufficient to hold them up.

Conclusion.

To conclude this article . . . . one must admit that it is very tempting to dream of a weapon of such power that it will shortly drive the tank from the battlefield. During the war the Germans for a long time comforted themselves with this hope. . . . General Bernhardi writes in his book *Vom Kriege der Zukunft,* which was published in 1920: "One will probably be able to compare tanks with the war elephants that Pyrrhus employed against the Romans. He obtained from them at first great moral effect, but his enemies soon found the remedy and the use of elephants failed before their trained courage." It is easy to answer General Bernhardi by saying that the comparison is feeble. Even if the use of elephants soon came to an end there are other examples (e.g. the struggle between gun and armour) that have been going on for centuries; sometimes one side has the advantage, sometimes the other . . . . it may be that we are witnessing the commencement of one of these interminable contests between the tank and the anti-tank weapon.

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TRANSLATIONS FROM THE GERMAN.

By Lieut. P. G. E. Warburton, M.C., R.A.

I. INFANTRY GUNS. By Major Zimmerle.

(Artilleristische Monatshefte, July-August, 1924.)

[Major Zimmerle, who is on the Staff of the Artillery Commander of the 2nd Division, is a well-known German writer on technical military matters; his best known book is *Waffenlehre*, an excellent elementary treatise on the technical characteristics of all arms.]

THE question of a practical infantry gun is at present occupying the attention of all military powers. In Germany, under the pressure of the dictated peace of Versailles and financial stringency, we have to content ourselves with what we are given.

In the attack, the task of the infantry gun is to break down the resistance of individual machine guns, trench mortars, guns and tanks; in defence, resistance to the assault and the accompaniment of counter-attacks. These tasks only require a limited range, but great mobility, rapid rate of fire and facility for coming into action quickly, a low carriage, great accuracy and a shell with adequate explosive effect. With the exception of tank targets, an improved light trench mortar with a range of at most 3,000 metres and a somewhat increased rate of fire and facility for opening fire (breach loader), would suffice. The light trench mortar has a great advantage in its curved trajectory, which enables it to take on targets under cover at short range. In Italy it appears that experiments are being made with a 75$^{m/m}$ trench mortar of this type. In England, according to the latest news, they appear to have adopted a 3·7″ howitzer which will take to pieces, with a 9 kilogram shell. Belgium uses our light trench mortar as an infantry gun. These countries, however, are more favourably situated than we are in Germany, for they possess gun-carrying tanks, which can take up the battle against enemy tanks at very short ranges, side by side with the

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close range artillery. For anti-tank work it is essential that the shell should have great piercing power (high striking velocity) and this a light trench mortar does not and cannot possess, because otherwise its mobility, low carriage, the curvature of the trajectory or rapidity of opening fire, would be interfered with to an inadmissible extent.

A reduction of the calibre and of shell power would be contrary to the war experiences of all countries and must therefore be ruled out for all tasks except that of anti-tank work. It is therefore desirable to entrust this last task to a special anti-tank gun of small calibre. This solution is not practicable for Germany for obvious reasons. In other countries this idea has not been taken up with enthusiasm (e.g. England), for it would necessitate the construction of a specialized weapon, which would be very costly, and it would complicate the question of equipment and supply, while there is no guarantee that it would be ready in the right spot at the critical moment to defend the infantry against an attack. For an attack on strong points such guns are not suitable, because they only give sufficient effect if direct hits are obtained. It is, as everyone with war experience knows, rarely possible to locate a machine gun or trench mortar nest accurately, which is essential if direct hits are to be obtained. A quicker and more certain result is to be anticipated from the splinters of bigger shells. We therefore see that the question of the infantry gun has not yet been satisfactorily settled anywhere and the necessity in which Germany finds herself of using the 96/16 field gun as an infantry gun for lack of another weapon is in no way to be regarded as archaic. It is true that the verdicts founded on war experience are by no means universally favourable. Especially during the rearguard actions of 1918, the anti-tank defence sometimes broke down. This was, however, very frequently due to improper employment or to a lack of mobile power which prevented a rapid change of position.

The chief disadvantages of this gun are its great weight, high carriage and flat trajectory. The same principle must be applied to the infantry gun as to other artillery, namely that it must shoot from covered positions. But this gun's flat trajectory so often renders an open position necessary that the above principle becomes almost an exception. The protracted employment of the gun is out

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of the question, since it becomes a target for a concentration of enemy battle-planes, counter-batteries and infantry guns; no tank attack and no regular counter-attack will take place without these enemy weapons. It is essential that the infantry gun should only be employed for tasks for which the other heavy weapons, especially the light trench mortar, are not adapted. The employment of this costly and very vulnerable weapon in the open always involves the danger of its loss; this danger is always imminent, both on account of the anxiety for action felt by the gun commander and the easily understood wish of the infantry commander to protect his troops.

In the nature of things the infantry battery can hardly be used as a unit in battle. The small number of guns available and the lack of cover usually met with in the front line makes it unlikely that these guns can even be employed in sections very frequently; as a rule the allocation of one gun with one or two ammunition wagons must suffice.

The infantry gun follows the infantry from one covered position to another. It will often be necessary to gallop across areas which are under observation or fire from the enemy. It will rarely be possible to come into action in the open even when under cover from ground observation, since enemy aerial action must always be expected. In view of the necessity for mobility of gun and ammunition wagons and of provision for unavoidable losses, four-horse draught is undesirable and six-horse draught is a necessity. The approach to the firing position, unlimbering under cover and pushing forward the unlimbered gun into its position, also any change of position, require the most careful reconnaissance of the route. It is necessary for the gun commander to be with the infantry commander for purposes of liaison. Therefore the infantry gun requires at least one mounted man for reconnaissance and communication between the gun and its commander. Faultless co-operation between the commander, despatch rider, the teams, the gun detachment and the ammunition wagon necessitates a very careful training and a good tactical understanding on the part of the gun commander (officer or senior N.C.O.). Time must always be allowed for reconnaissance, otherwise the gun will probably be lost before its task has been carried out. The preparation of the ammunition for action and its stowage in the wagons after action must

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be carried out quickly. The ammunition wagon must carry five or six men who will be employed for moving the unlimbered gun (drag ropes) and to replace casualties in the gun detachment.

It is essential for the work of the gun that it should be equipped with the necessary stores—one director, telephone equipment and signal equipment. The issue of a light machine gun in addition to carbines and hand grenades is advantageous; the machine pistol which is the most suitable weapon, is not authorised for use by Germany.

The number of types of ammunition must be reduced as far as possible. Against the numerous vertical targets met with in infantry warfare (thin cover from view, bushes) the instantaneous fuze or the ordinary impact fuze may often be used with H.E. shells, though the former does not always act when the angle of impact is small. Against well-protected targets (sand-bag defences and walls) the delay-action fuze is necessary. This may also be used for ricochet action, to give the same effect as a time fuze which has a high moral effect at short ranges, thus simplifying the question of supply. Against targets protected by armour, shells with armour-piercing heads are necessary. For close defence a few grape shot must be carried. Shrapnel must be omitted, otherwise the types of ammunition become too complicated; the usual shrapnel targets will be dealt with at short ranges by the light machine gun.

The infantry commander will always give the infantry gun its approximate position of readiness. He orders the place, approach and nature of position (open or under cover) for its employment, the target and the procedure when the task is fulfilled (new rendezvous). It is wrong for him to give a general direction such as "to support the advance of the company." This is a matter for the divisional artillery and the infantry gun must be given a perfectly definite and limited task such as "to destroy the machine gun firing from the barn in front of us." The opening of fire from an open position must be preceded by careful preparation (setting the sights at the approximate range, explanation to the detachment of the firing position, the approach and the target while still under cover; preparation of the ammunition in the firing position). Hence it will often take longer to take up an open position than a covered position; on the other hand, the actual execution of the task will

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be quicker in an open position. On account of the nature of the targets of the infantry gun, it is frequently impossible to limber up to move it after it has gone into an open position; this may, however, be justified by the situation.

The main essential is that the detachment of the infantry gun should be carefully and thoroughly trained and that the gun should be commanded by an enterprising leader who is tactically trained and can act on his own responsibility when necessary. It is obvious that it will not be possible to use every single gun of a battery as an infantry gun, because the necessary equipment and specially trained personnel is not available for all guns. On the other hand, it is entirely wrong to employ the valuable personnel and material of infantry batteries to carry out tasks which belong to divisional artillery.

II. ANTI-AIRCRAFT GUNS IN THE CAMBRAI TANK BATTLE.

(Reprinted in the "Militär Wochenblatt," 25th August, 1924, from the "Flakverein" No. 12.)

THE battle in Flanders continued to rage in the autumn of 1917. But the British, seeing that their attempts to break through were vain, were already making quiet preparations for a powerful thrust in the northern sector of the Second (German) Army. Nothing betrayed the imminence of an enemy attack on a big scale at this point, at which the German defences were particularly strongly developed. No new divisions were put into the line, no increase in artillery fire indicated the enemy's plan, which, according to a captured order, had no less an object than to break through the Hindenburg line and open the way for the British cavalry to exploit the infantry success. The enemy succeeded in concealing his intentions with great skill, not only from us but from his own troops.

On the morning of 20th November, 1917, behind a sudden artillery bombardment and under cover of fog and a screen of

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smoke shell, 300 monsters, spewing death and destruction, trundled forward against the German lines. Suddenly looming up out of the mist, flattening out everything in front of them, destroying the German obstacles, which were over 100 metres wide, crossing trenches, breaking down walls, and snapping trees in two like matches, the tanks cleared a way for the closely following infantry. A very critical situation resulted. Towards mid-day the enemy flood surged up to the suburbs of Cambrai; it seemed that nothing could now block the path of the armoured giants. Then, suddenly, at the last critical moment, a halt was called to them in brazen tones. Shot after shot was poured at them by an anti-aircraft battery, which took up a position of readiness south-west of Cambrai when the news of the British break-through arrived. In a short time three tanks were immobilized. The others retired under cover, somewhat annoyed at the unfriendly welcome which was given them at the gates of Cambrai.

But the determined foe did not lose his hold. Where the tanks had failed the cavalry should force their way. Two British squadrons had already advanced to the left flank of the battery using the ground cleverly like stalkers. Breaking cover suddenly, they sought, in the old cavalry manner, to clear out of the way the killjoy who had so rudely stopped the tank terror. How the battery commander's order rang out and the guns swung round! How the gunners worked! A rapid torrent of fire struck the cavalry mass which had approached to 100 metres. The effect was cataclysmic. A confused tangle of corpses of men and horses covered the blood-soaked ground. Stray horses, smarting with pain and stripped of their riders, leapt wildly about. Only a few of Albion's proud horsemen in wild flight succeeded in gaining cover in La Folie Park nearby.

* * * * * * * *

The anti-aircraft weapon had shown that it could play its part in ground warfare too.

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SHOOTING IN THE CENTRAL PROVINCES OF INDIA.

By Colonel A. G. Arbuthnot, C.M.G., D.S.O., R.A.

Chapter I.

THERE seems to be a belief among gunners at home that the soldiering, sporting and financial attractions of India have vanished since the war; and that the political detractions are considerable. I have heard no reliable evidence from India to support this belief, and much to refute it. Soldiering has greatly improved since the bad days of 1919 and early 1920, and sport, with which this article is concerned, is unquestionably better than in pre-war days. The gunner in India, as at home, has since the war taken a very prominent place in sport, and his prowess in polo, pigsticking and shooting has been most marked. Pigsticking I place as the finest sport in the world, and everyone going to India should take General Wardrop's book to read on board and afterwards. Big-game shooting comes a good second, and the gunner who has stalked the ibex in the Himalayas and tracked the bison in Central India, will realize in the next war that he did not waste his years in India!

Big-game shooting in India may be broadly divided into two categories, the stalking shooting of the Himalayas, and shooting in the great forests of Southern and Central India. It is of the latter that I have been asked to write, although I can never admit that as a sport it can compare with exploring and stalking in the wild mountains beyond Kashmir and Ladak. Usually, also, if a soldier has to decide whether to spend his two or more months' leave among the snows and pine clad mountains of the north, or in Central India, he rightly chooses the former as the best antidote to the heat of the plains.

Those who are fortunate enough to be stationed in or near the Central Provinces, at Jhansi, Mhow, or Jabalpur, should have no difficulty in sampling both descriptions of shooting. From these stations with a little interior knowledge, and carefully prearranged plans, a most delightful 10 days can be spent in the heart of the

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jungles, at Xmas or Easter, or in late May or early June when tiger are easiest to locate; and this without prejudice to two months' leave in the Himalayas. Jabalpur itself is perhaps the best shooting station in India, situated as it is on the borders of the Central India Highlands, with hundreds of miles of primeval forest on every side. Here, if sufficient trouble be taken to study the forest maps, collect all possible information, and go out and personally investigate and interrogate the natives, tiger, sambhar and cheetal, etc., should be obtained within 20 miles of barracks on a Saturday and Sunday shoot.

To my mind there is nothing so delightful, so refreshing to mind and body, or so good for one's work, as to be able to get away now and then from the dust and heat, the tennis and dances and club of an Indian station, and spend a day or two in the cool silence of the forest; once captivated by the lure of the wild, it is seldom indeed that the gunner subaltern will find himself spending a week-end off duty in Jabalpur Barracks. The first essential on going out to a good shoot-station in India is to definitely make up one's mind that one is going to take full advantage of the gifts of the Gods and devote one's energies to those forms of sport which cannot be obtained except at great cost in other countries. This is surely a better attitude to adopt than brooding over the lost delights of hunting, or partridge shooting, or London dances!

It takes some moral courage, I have noticed, to leave fields in which one has attained some proficiency, and enter as a novice in new sports of which one has had no experience; but those who lack this courage have no right to the name of sportsman. The novice on arriving, say at Jabalpur, will be wise to cultivate the acquaintance of the civil officials, and forest and police officers; among them he will still find many good sportsmen ready to help him, but long sojourn in India leads to considerable reticence as regards such things as tigers, and it is his own enterprise and perseverence that will bring him success. His best plan will be to gain all the information he can in conversations, then go to the forest office armed with a list of "jungles" compiled by the most knowledgeable of his brother officers and take a "jungle" within say 15 to 30 miles of barracks for a month; if he can get a friend to share his enterprise or take another adjacent "jungle," so much the

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better. The Central India forests are divided into blocks, and a jungle, of perhaps a hundred square miles, may be hired for some very small sum, I think Rs15 now, for a month. Some good and some bad are reserved for officers stationed in the Jubalpur District, and some are reserved for soldiers. With Indian officials and subordinate clerks it is wise to study the rules and make quite sure that a jungle you have asked for and failed to get has been definitely recorded as allotted to someone else. I will not dilate further on procedure, as that can be picked up on the spot; the main essential is that you *must* cultivate that love of the jungle which will make you free of nature's secrets, reveal to you pictures no pen can portray, and store your memory with days and incidents that for all your life are a pleasure to recall.

Have you ever met a big-game hunter who is half hearted? whose whole being does not alter when the sight of a pair of horns on a wall, or the yarn of a brother sportsman, brings him back to his camp by the mountain stream or his tent by the forest glade? These men have found something in life which others have missed; and why? because they have taken advantage of their sojourn in India to penetrate the mysteries of the jungle, and by their enterprise and persistence to prove that a subaltern, on his pay, can partake of every sport that India offers. There are difficulties to overcome from the very start; the resentment of the old inhabitant; the pessimism of those whose enterprise is confined to the club and the bar thereof; the jealous antagonism of a few so-called brother sportsmen. Do not be influenced by any of them, but go and try. Each time you will learn some more of jungle lore and its fascination, each time you will be more determined to try again.

Let us take a typical Central India week-end leave; perhaps an "extended week-end" including the Thursday holiday, if you are the fortunate owner of a Major who has noticed the extra gloss of your horses' coats, and the general increase of zeal in your section, when you, and occasionally some of your men, have had a day or so in the jungle.

You have some time ago taken a forest block for the month of March; you have been out there and explored parts of it, and made friends with Ram Singh, a wizened lame old man in the nearest village, introduced to you as a great shikari. Ram Singh for the

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last week has been tying up your two fat buffalo calves which your bearer bought for you at a local market at Rs12 each, and enriched himself by a new velvet and gold cap at the same time. Last Monday Ram Singh sent in his small boy, a lad of about 15, to tell you two tigers had arrived in your jungle and eaten one of your buffaloes; he was not going to tie up the other till you came out. After polo or evening stables on Wednesday you return to your bungalow to mobilise your kit. Your bearer awaits you with a bullock cart he has obtained from the bazaar. A roll of bedding, a large lunch basket, a box of soda water packed in wet grass, and your rifle and gun, are all you want, besides grain for your pony, for there is a good little forest bungalow on the edge of the jungle. Don't forget to see that your "medicine chest" has been packed in your haversack! Some quinine, lint and bandages, permanganate, iodine, and mercury tabloids; also that your skinning knives and steel measuring tape are in their proper place in your rifle case. If you have a light rifle, ·318 for choice, take it as well as your ·400 high velocity, for you ought to get a buck or a chinkara on the open plain outside the forest.

Pack off your bullock cart, accompanied by your bearer and syce, as soon as possible, with orders to spend the night at the river 6 miles out of cantonments, and to start again an hour before dawn next morning. For yourself, next day, after a light and early breakfast in your bungalow (to be a good "shikari" you must be able to eat a breakfast at any hour), you should be in the saddle by 6 a.m. and cover the 15 miles hack to your destination by 9 a.m., about the same time as your cart arrives. Ram Singh and one or two of his relations, are awaiting you with joy in their countenances and tales of a very big tiger and his tigress that seem to have settled in your jungle; Every day he has seen the "pugs" of one or both on the forest paths. From the "pugs" he is quite sure this tiger is the same "bara badmash" who killed his uncle when he broke back in a beat some years ago! There is also an evil leopard that has eaten several of the village goats, but that is a yarn you have suffered from before and you decide to leave him alone till he eats another and you can find the remains.

After buying some grain for your pony and seeing him comfortably picketed under a tree, you start off to explore the forest

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with Ram Singh and two of his satellites, who carry your lunch and at times your rifle. It is now nearly 11 o'clock and getting hot, but how much fresher and cooler than among all the houses and barracks of cantonments. You spend a most interesting day in the jungle, and get a fair idea of its geography; Ram Singh points out the tigers' "pugs" on various forest paths, and the tree-stump where he tied up your buffalo; but to be quite satisfied that all is "O.K." you must find some unquestionable tracks *yourself*, so you follow down a dry sandy river bed, in spite of Ram Singh's disapproval, till the jungle on either side gets denser and mixed with small clumps of bamboo; under some overhanging rocks is a small stagnant pool of water, and there you find the "pugs" of a fair-sized tiger, some quite new and some several days old. Ram Singh says they are the tracks of the tigress, and probably of yesterday morning. So now you are satisfied that the "khabar" [1] is reliable, and your respect for Ram Singh goes up. Don't disturb the thick ravine any further, but get away and try to worm out of Ram Singh how he proposes working the beat should the tiger kill again. His arrangements will be based on past experiences and he will have difficulty in explaining them; here a knowledge of the language especially the jungle dialects, will be invaluable to you; without this knowledge you had better leave it to Ram Singh, and he will probably give you a replica of a beat that once succeeded and often failed! The main points to find out are, (i) where does the tiger lie up after his meal, (ii) what point does he make for, and what route does he like to take, when disturbed by the beaters.

It is most extraordinary how different tigers instinctively take their kill to the same patch of cover, lie up not far off in the same bit of jungle, and follow the same line of escape when disturbed. I have known in a jungle close to Jabalpur, three successive new tigers in one week kill a buffalo tied to the same stump, eat him in the same place, follow exactly in the tracks of their predecessor, and be shot from the same machan! The second tiger I shot while pausing to sniff the dried blood of the first which I had shot three days before; promptly a new third tiger came into the forest, and four days later a friend of mine wounded him severely at the same

[1] Information.

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spot. The sequel here is worth recording; my friend after waiting an hour to let the tiger stiffen or die, tried to stalk round the cover where he was lying; he suddenly felt an express train hit him in the back! He and his rifle flew in different directions, and next moment he was seized and shaken like a rat, thrown away, and seized again. Fortunately he had a companion (but not alongside him as he should have been), who hurried up, missed the tiger, but frightened him off!

Permanganate was not far off, but no iodine; blood poisoning set in, and for many weeks my friend's life was very uncertain. He recovered, more or less, but has never really got over his mauling. Moral, it is madness for a single man to walk up to a wounded tiger in jungle; if there are two of you you must never separate; antiseptics must accompany you always, for yourself and your beaters. Never think a tiger is "probably dead."

In the evening you return to your forest hut, and after tea take your gun and light rifle to the open plain patched with jungle on the other side of the main road. There are some chinkara over the far side—pretty little gazelle—all does or very small buck your glasses say; over beyond are three lying down near some bushes, two with quite good heads. Test the wind, watch the does, and no matter what the game may be, take infinite pains over your stalk; a chink is a small target and you must get a sitting down shot at about 100 yards; after all, the stalk is the whole of the sport, and every stalk teaches you something. A successful approach, after the first attempt was spoilt by a doe, a sitting shot, a bullet through the shoulder blade at 80 yards, and your food for the week-end is assured; also an 11-inch head that is well worth keeping accompanies you home. There are some peacock down by the river there, but you will wait to take one of them back with you on Sunday. You have just time to go out to see that Ram Singh has tied up your buffalo correctly before dusk, and back to dinner and a well-earned sleep.

CHAPTER II.

The night in the jungle is even more beautiful than the day; cool and fresh and full of life; gradually the forest wakes with noises and cries that entrance you; a sounder of pig are nosing round the

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edge of the clearing; far away the startled cry of a sambhar oft repeated tells you that a tiger is on the roam; perhaps later on you may hear his metallic "conk" as he goes his rounds, but seldom if ever will you hear him roar. At last you fall asleep in the verandah, to be woken up by the distant shrill hunting cries of a pack of wild dog relentlessly pursuing some unfortunate cheetal; this is bad, for if they come into your jungle everything, including your two tigers, will leave it; but the chase seems to die away far off on the hills beyond the river. Again to sleep: an awful crash in the room alongside you, followed by a rush from your dog; then howls and screams as the latter retreats to the cover of your bed! Has the big tiger you were dreaming you were measuring taken the offensive and caught you napping? No, it is the usual semi-wild bungalow cat that has upset your milk jug, and gone off with your bacon.

Next morning, feeling wonderfully well in spite of a disturbed night, you sally forth with Ram Singh to visit your buffalo and look for fresh signs of tiger. Wear sambhur skin rope soled boots for choice, go carefully and not too early. As you get near the tying up place you find you are following the fresh pugs of a very big tiger—trembling with excitement you get nearer: there surely is the spot? An old tree stump, some trampled grass, a broken rope—and no buffalo! What a relief! Hold hard, and look and listen a bit; some tigers kill late, and the tracks were very fresh. Approaching nearer, the tragedy is revealed; there is the trail through the grass where the poor buffalo, killed no doubt at one expert stroke, has been dragged away into the thick jungle on the edge of the ravine. No use investigating further for you cannot follow through that scrub without making an awful noise. Back to camp, and Ram Singh, bursting with importance, readily enlists a forest guard, the village headman, and an office babu on leave, to help collect beaters. You to breakfast, to clean your rifle and wipe out the oil, and to tear up 100 small squares of the "Pink Un" to serve as tallies to dish out to beaters.

The rest is an oft told story; but there is a fascination and excitement about a tiger beat which no pen can reveal. The beaters arrive, nearly 100, including about 30 small boys, who get half tickets only; you turn away one or two imbeciles and some very small boys, and give out numbered tallies to the rest. Ram Singh selects

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about a dozen of the blackest and most "jungly" stalwarts as "stops," sends them with you under his brother to the machan which has been hastily made, or rather repaired, and takes off the rest to the beat by a circuitous route.

At about 1 p.m. you reach your machan and have time to see to the careful placing of the "stops," whose job it is to form a bottle neck to the end of the beat. They climb up trees and keep quiet unless the tiger comes a bit wide, when they nurse him to the centre of the neck by cracking a twig, or by a slight tapping. A long wait, and at last far away you hear the shouts and beating of tom-toms that means the "honk" has begun; and your excitement too; if the tiger came now you would miss him for certain, for your hand trembles visibly! but by the time the beat gets quite close you will be quite cool. For a long time nothing happens; then you hear a sound—yes, there it is again, something big too!—two, three, four soft heavy footsteps, and then a pause; sounds quite close; again three or four more heavy steps; something cautiously approaching straight towards you! tremblingly you press forward the safety catch of your rifle—and shuffle a little in your machan. Whirr! up gets a great peacock! Now you ought to have known that, you must have read about it; but it has done you good and you are steadier and calmer. Also that bird *saw* and *heard* you, which must not happen with the tiger.

Next comes an old boar with indignation and battle in his eye; then two sambhar does walk silently, softly, past you. Then a fine sambhar stag, as big as a pony, comes crashing through the jungle, and halts and looks back. His great gnarled horns make your mouth water, but you must leave him for another day. A sudden crescendo of shouts and tom-toming from the beaters makes you half raise your rifle—they are quite close now, and very excited; a tap, tap, from the stops on your right—the noise dies down, and only the Shikari's vioce is heard exhorting his army (who are probably mostly busy climbing trees!)—then suddenly fresh shrieks and yells mingled with three of four unmistakeable roars from the tiger, as you get a glimpse of a great flash of yellow charging straight back through the beaters to safety beyond! An impression of the personification of strength and speed is all that is left to you; a feeling that an 18-pdr. gun could never stop such a

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charge! then dull dismay that the biggest tiger ever seen was lost and gone. But you have seen an angry tiger charge, and it is a sight you will never forget.

Next day, Saturday, opens sorrowfully. That tiger was not 30 yards from you when he broke back, though you had no idea of it. However, a long walk round the far end of the forest repays you by your finding quite fresh tracks of the tigress along the river bed. Following them along a path by the edge of the forest you reach a very secluded ravine; a strong smell hits you in the face; Ram Singh smiles and whispers "gara hogea"! (there has been a kill!). It is nearly 1 p.m., the time all respectable tigers should be sound asleep, so with loaded rifle and great caution you follow the smell; Ram Singh, with the nose of a bloodhound, leads you straight to the fresh remains of a cheetal's stomach. Then you follow the trail; at first the cheetal has been dragged; then for a bit it must have been carried, as only the tiger's tracks through the grass are visible, and occasional patches of blood.

It is an exciting hunt; at every turn in the track, as you round each bush, you expect to see the tiger standing at bay over his kill, or in the act of springing on you! After 300 or 400 yards the trail disappears into a thick clump of bamboos about 80 yards in diameter. With redoubled caution you creep round the outskirts of the clump looking for an exit trail, but there is none! The remains of the cheetal must be inside, and possibly the tiger too; but more probably he would lie up further away after having a drink, so as not to be pestered by flies. A slight withdrawal and a whispered consultation with Ram Singh produces a rapid appreciation of the situation: (1) The tigress is either in the clump, or more probably asleep outside. (2) In either case she will come back to the kill between 5 and 6 p.m. (3) To enter the clump now can do no good, and might do harm. (4) You have been walking since 6 a.m. without food or drink, and are not in a good state to tackle a tiger on its kill! (5) You decide to withdraw half a mile to where you left the two men with your lunch, and return and enter the clump at 4 p.m.

Refreshed with excitement and much renewed hope you settle down to a well-earned drink and lunch. At about 2.30, with your meal but half finished, and your hunger just beginning, you are startled by the loud cry of a sambhar, then another, and a third!

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The tigress must be abroad! some instinct has perhaps made her anxious about her kill. The unusual has happened, as it often does, and you hurriedly leave your lunch and start off with Ram Singh. Almost at once your fears are confirmed by that curious metallic "conk" of the prowling tiger from over beyond the bamboo clump. It is going to be a race; if you can reach the clump first, and unheard, you have an even money chance; if the tigress gets there first she *must* hear your approach, and she awaits you on her kill with every advantage of position, rightful ownership and knowledge of your movements: your chances are 10 to 1 against!

Hurrying on as silently as possible you hear the "conk" again, much closer. Another single and more distant alarm cry from the frightened sambhar warns all animals that the great slayer is afoot. Now you are in view of the bamboo clump, and a "conk" from the tigress sounds just the other side! As you approach the clump extreme caution takes the place of haste; Ram Singh is left behind, up a tree; as you pause at the edge the tigress gives a low, more muffled grunt, horribly close, but rather more to the right; it looks like being a dead heat! Silently you creep from clump to clump of bamboos, to step on a twig may be fatal, and reach a small open patch of grass in the centre.

One glance shows you the remains of the cheetal, only one hindquarter eaten, hidden under the shade of overhanging branches. For a few seconds you stand and listen, with rifle ready and cocked: you have entered the straight a length or so ahead, but the last fence is a snorter! Hurriedly you look round for a tree to climb, but there is not one! Only long bamboo poles; you climb a short way up one great overhanging pole which adds to your view over the long dry grass, but is otherwise of no value as your legs hang down only 4 feet from the ground. Not another sound from the tigress, and a deadly stillness seems to fall upon the forest. Suddenly an old crow starts cawing from a bamboo on the opposite side of the clearing; not only cawing but pointing, and cawing *at* something! Some small birds come to life with an excited twittering, and fly from clump to clump. The old crow, cawing angrily, flies away to a further tree, and you feel deserted by your only friend. A deadly silence again, and you feel the moment of your duel is at hand, and moreover, nothing but one single fatal shot can

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avail you; with this realisation confidence in yourself and your rifle returns. Still not a sound of a step or the crack of a leaf, yet you can feel that the great slayer is quite close. You smile as you remember that streak of lightning yesterday, when you wondered whether an 18-pdr. could stop an angry tiger in full charge.

Suddenly you see the long grass moving! a yellow streak is just visible through the top gliding perfectly noiselessly towards the kill—it is the tigress' back—she stops not a dozen yards away, and you gently raise your rifle. She raises her head and looks straight into your eyes—for a fraction of a second you are lost in admiration of her great and beautiful head! but only for a fraction—slowly the benign expression of strength and beauty changes to one of deadly hate and fury, as she gazes into the eyes of the miserable man who would dispute her lawful meal! Her neck, the most fatal shot, is hidden, and so is her shoulder; quickly, for in a moment she will spring, your rifle turns to the top of her shoulder and rests about 4 inches below her withers, just visible through the top of the grass. A slow and gentle pull—and all is over. Without a sound or a struggle the magnificent great beast lies dead on the ground, as if she had just fallen asleep.

But don't take it for granted she is dead—load up your rifle again and *wait*—throw something at her, throw your tobacco pouch, a cartridge or two, anything you have; if your shot went a shade too high she may only be stunned. She responds to none of these, so you cautiously slide down your uncomfortable bamboo pole, and try her again with a heavy stone. Then approach cautiously till your rifle rests on her neck. She is stone dead; your shot broke her spine; with a shot through the heart she would have pulled you down the next moment and died only after severely mauling you. A shout and several whistles bring up Ram Singh and your lunch coolies and they all embrace your boots and ask for tobacco. Now to measurement before she stiffens; she is a magnificent tigress in beautiful condition. Pull her on to level ground—pull out head and tail as far as possible, till her back is quite straight; put a peg against her nose and another at the tip of her tail. Drag her or roll her away and measure with your steel tape from peg to peg. Eight feet 11 inches—a very good tigress indeed, *pre-war* measurement! Since the war, curiously enough, tigers or their measurements seem

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to have grown a foot or more, but that does not concern you. When skinned your tigress should tape about 10 feet 3 inches, but that does not count. Back to camp, with a day behind you that you will treasure in your memory all your life; that shot was a lucky one, and an unusual one; a tiger does not die as easily as a lion. Eight stalwart men bring in the tigress on a pole by 6 p.m., and with lanterns and fires the two most expert commence skinning at once. The main point you must insist on is that the skin is taken off clean and white with *no* meat on it. Rowland Ward's small book on taxidermy will tell you the rest.

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DIXIELAND.

By Lieut. P. G. E. Warburton, m.c., R.A.

THROUGH song and story the southern group of the United States of America is pictured by the average Briton as a land of heat and cotton and idyllic existence—of landed gentry and irresponsible singing negroes. Many politicians, lecturers and writers have recently visited the United States and have told us much of New York and the intellectual New England States, of the busy Middle West and balmy California, and of the nation's capital so appropriately situated where northern and southern people and influences are so intermingled that neither is predominant. We are, however, still largely dependent upon fiction for our knowledge of the wide area around whose cotton-fields, ragtime songs and pickaninny lullabies centre, but which has, in reality, changed remarkably during the past few years.

Southerners regret the passing of the poetic era of the South, but are now awakening from a lotus-flavoured life to an active realization of their industrial possibilities. These people are descended almost entirely from the original British stock, and an Englishman there finds himself in a most friendly atmosphere. I had the good fortune last autumn to visit Alabama, North Carolina and Tennessee (as well as some northern States) under very pleasant circumstances.

The lapse of nearly a year since that six weeks' whirl of hospitality has not sufficed to condense my impressions sufficiently to admit of any attempt to reproduce them concisely, so I shall only attempt in these few pages to give some fragments.

The South is the country of small towns. The hospitality of the North is wonderful, but in the small towns of the South (nobody who is of any account in the parts I visited lives in the country!) you feel you really are welcomed by the entire community. It is only necessary for people to learn that Mrs. X—or Mary or John X (for entertaining is usually done by and for the

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younger generation) is going to have a guest, for a score of parties to be arranged in honour of the as yet unknown friend.

As a visitor to the South, you must take all your superlatives with you, otherwise you will feel rather like an icicle trying to be poetic to a salamander: on the other hand, do not be led into proposing to the local heiress by being told that she has declared you to be "the *most* w-o-n-derful man" she ever knew; that may be interpreted "you are not a bad fellow; anyway, I like your host and therefore his friends."

Sociability is a great characteristic of Southerners, so, in both large and small towns, everyone has many friends and social life is complicated. This accounts in part for the careful allocation of the days in many places: on Sunday morning, Sunday schools (well attended by old and young) and Church—in the afternoon trips in "automobiles" (which are almost always driven by their owners); on Monday, church and welfare society meetings; Tuesday, literary or musical clubs or civic organizations; Wednesday, Thursday and Friday are given over to bridge, receptions and other social functions, such as men's club luncheons; Saturday afternoons are spent motoring, at the country clubs, or watching football or baseball. It is very remarkable to an Englishman that very few American men play these games once they have left College, but confine themselves chiefly to golf, tennis, and swimming.

Clubs are a great feature of the life in all the towns which I visited and the intense civic spirit and pride of the American does not permit most of these to be the self-centred organizations which they usually are in England. Thus the Mayor finds his elbow jogged by the Rotary Club in the matter of the untidiness of the main street of the town, while the Kiwanians agitate for sign-posts on the roads in the neighbourhood, some women's club will take the local hospital under its special care and a men's club runs a gymnasium in connection with one of the boys' schools.

In most cases, these clubs have no building of their own, but meet on certain days in an hotel or other public building, the men's clubs usually meeting for lunch. When asked to lunch with one of these clubs, you may be fairly certain that you will not get away without making a speech, a form of exercise in which the average Englishman indulges but little.

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The Americans are rather fond of whimsical warning notices. At the railway booking office you will see "Keep your temper; nobody else wants it." As your car enters a town you will find painted on the asphalt "Slow! Two Fools may Meet!" The "street-cars" of some towns are decorated with "We want you to feel at home in these cars; do you spit on the floors at home?", while I saw the same admonition expressed in a cotton mill thus:— "Ladies and Gentlemen will not, others must not, spit on these floors."

"Stop! Look!! Listen!!!" at the innumerable level crossings is designed to reduce the annual average of 2,000 collisions between motor-cars and trains at these points. In the South, as in most parts of the States, everybody, old and young, and even the dogs "ride in automobiles" for amusement, "exercise," and business. The improvement of the roads, which is making rapid progress, is facilitating touring and long-distance travel by car, and contributing in an enormous degree to the development of the South. Most, if not all, towns in the South can move their whole population and much of their chattels in the cars owned by them.

Whatever may be the truth about Prohibition in other parts of the U.S.A., there can be no doubt that it is working in Alabama, North Carolina, and Tennessee and, I was told, in the neighbouring States. This does not mean that drink is unobtainable for those who will pay the price and take the risk, but getting drunk is very expensive and if your host does offer you "a drop of something stronger" a refusal will not be unwelcome.

Under the system of local option, the above-mentioned States had forbidden the sale of intoxicants for years before the national measure, and the latter is now vigorously enforced. Many British critics of prohibition forget that we are saved the complication of living amongst coloured people, also that the sales in the American saloons were chiefly spirits (often more potent than healthful), not the much less harmful beers, wines and ciders of our public houses. I was assured, even by men who grumbled at it, that Prohibition had worked a wonderful change in the general prosperity of the South, and I am sure that a referendum there would show a very small proportion of votes for repeal.

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In the North, which I also visited briefly, the situation is different, liquor is fairly plentiful, if expensive, and the "boot-legger" drives a popular and lucrative trade, so lucrative that another profession, that of "high-jacks" has sprung up to prey on the "boot-legger," who has, of course, no protection from the law. By violence or trickery the "high-jack" robs the "boot-legger" of his winnings.

The best effort in this line of which I heard was the following. Two "high-jacks" provided themselves with counterfeit Federal police badges and warrants. Having got wind of the arrival of a motor-lorry load of whisky from Canada, they proceeded to meet it. They showed their badges, inspected and then seized lorry and contents. They drove to the nearest police-station, gave the lorry owners into custody, drove the lorry away to "hand it over to the proper authorities," and left the town. At the next town, with their badges concealed, the confederates separated. One proceeded with the lorry and got in touch with the proprietor of an hotel a few miles out of town; he had soon sold the contents of the lorry to him for a handsome sum and, after a drink, they mounted the lorry together to deliver the goods. Meanwhile the accomplice, surreptitiously informed of the line of march, had got well along it during the drink. On the arrival of the lorry he halted it, showed his badge, seized the lorry, and ordered the driver to proceed to the police-station. Here the luckless buyer was committed to the representative of justice while the driver again proceeded, under the escort of the confederate "agent," to look for the proper authority to receive lorry and liquor.

Like most good games, this one was played too often and, after six "sales," the pair were caught in Albany.

I had the good fortune to be present at a nocturnal demonstration by the Ku-Klux-Klan in Alabama. It was well advertised in advance by hand-bills. About 1000 hooded and surpliced figures, many of whom had arrived in this garb by train during the day, and some 200 recruits in plain clothes formed the parade, from which some 2000 spectators were kept away by a rope and a few sentries. The recruits, preceded by a white (electric light) cross, marched around a red cross (also of electric light bulbs), over which the Stars and Stripes were dimly visible, in the middle of a hollow three-sided

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square formed by the initiated. Some speeches, inaudible to us, were made. Suddenly every hooded figure lit a pink fusee, while, behind them a gigantic "K K K," flanked on either side by a cross, burst into flame. After a few minutes a band in the background struck up a march and the crowd melted away and we with it.

Local opinion in general seemed to deprecate the activities of the Klan on the grounds that no private organisation has any right to take the law into its own hands or to work in secret, if its aims are good, thus giving bad men the opportunity to commit crimes in the guise of "klansmen."

My only glimpse of American regimental life was gained at Fort Oglethorpe, Georgia. On the strength of a formal introduction from the American Assistant Military Attaché in London, Colonel Fleming, Commanding the 6th Cavalry Regiment, motored to Chattanooga, on the Tennessee River, to fetch us. After an excellent lunch, we went out to watch the polo, played on a ground laid out on the large stretch of grass around which the whole "camp" (barracks, officers' quarters and club) is constructed. The "ponies," about 120 I think for the 25—30 officers in the regiment, are selected from the troop horses provided by Uncle Sam; on the big side and a bit heavy of course, but capable of providing good fun and training. The other expenses are met by the small fees charged for the parking of the hundreds of cars, which bring spectators from Chattanooga and the country around. Thus the regimental officer's polo costs him practically nothing beyond his kit and personal equipment.

The ground was far from perfect, but improving rapidly; the play was of good regimental standard. At the conclusion of the afternoon's play we hurried from tea to drive around Chickamauga Park with the Colonel before he took us back to Chattanooga. This park includes the scene of two of the big actions of the civil war and it and Lookout mountain, which dominates Chattanooga, are covered with tablets showing the exact positions and actions of the units participating in the successive battles in this area, a most interesting study for which I had all too little time at the end of this very pleasant and interesting day, which gave a very senior officer and his wife a deal of trouble for a very junior one and his. It may be of interest to add that, on the occasion of the regimental horse-show and other competitions, most of the prizes are presented by

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the firms with which the regiment has dealings in one form or another and by people in the neighbourhood who have enjoyed the polo, &c.

As I remarked above, the industrial life of the South is developing rapidly. Not only are they now working their own cotton and sugar (at about half the cost incurred by mills in the North) but mineral mines on the spot are feeding an ever-increasing number of local foundries and factories.

One great problem however, is that of labour. The old negro labourer of the cotton-field and the "mammy" of the kitchen are fast disappearing and the modern "educated" negro with his Ford (or Buick) is a fastidious and unreliable employee. Further, the higher wages and lack of racial discrimination in the North have drawn the coloured people away from the South in large numbers; though a great many return after short periods. So seriously is this migration regarded, that many southern states are meditating legislation against itinerant recruiters of coloured labour for the North.

To remedy this shortage of labour the South is anxious for immigration from the British Isles, which, largely owing to the virtual closing down of the southern ports for passenger traffic, gets absorbed chiefly by the North and West. These little southern towns, whose small houses, chiefly of wood or stucco, all stand in their own little unfenced gardens and where living is about half as expensive as in the North, should be very attractive to Englishmen seeking a living in the States.

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THE BIG BAGH AT CHANSA.

BY "GOLANDAZ."

Youth's daring vigour, manhood's fire,
Firm hand and eagle eye.
Must he acquire who doth aspire
To see the grey boar die.

THIRTY odd years ago Delhi, now the capital of India, was quite a small station from a military point of view, the garrison consisting of a company of Garrison Artillery, a detachment of British Infantry, a Battalion of Indian—or, as it was then called—"Native" Infantry, and about half a troop of Indian Cavalry. So far as concerned our professional duties we lived a quiet, unobtrusive life, the visits from brass hats being few and far between. Delhi was an important civil station, but though it was the headquarters of a Civil Division the Commissioner did not reside there, and the Deputy Commissioner and Divisional Judge were quite approachable by junior subalterns, when we foregathered of an evening at the "Institute," familiarly known as the "Pot-house" to the more irresponsible among us. There was no club at Delhi in those days, but the Institute served the purpose of a cock-and-hen club, and no doubt we were easily pleased. Besides the covenanted civilian or "heaven-born," the numerous civil officers of the Police, of the Public Works (mostly old Cooper's Hill men), and of other Government Departments, there were many others, principally bankers and merchants, some of whom were right good sportsmen. We all rubbed shoulders together and were a friendly mixed crowd, and on the whole it may be said that snobbery was very little in evidence.

The historical associations of Delhi are well known. In those days the R.A. Mess was inside the Fort, in a building where the Chaplain and his daughter and a disabled officer were among the first to lay down their lives in the Indian Mutiny. They had permission from the old king to take refuge there, but it was not long before they were butchered by the mutineers from Meerut. The

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British Infantry had their officers' mess on the other side of the Fort, overlooking the Jumna, in quarters once occupied by the royal harem. (It is difficult to understand why the habitation by Europeans of these and other delightful buildings in India and Burma came to be regarded as a sacrilege instead of a pleasant form of education; but such sentiments are frightfully re-actionary and politics must be avoided at all costs.)

The large native city, the Chandni Chowk with its obsequiously friendly and orientally polite merchants in silver, cloth and other artistic work; the huge Jama Musjid; the Hindu Temples; the superb monuments of the time of the Great Moghuls some miles from the city walls—all these, though lost to sight for many years, are still to memory dear; and to them must be added reminders of the Mutiny days, the Ridge, the Kashmir Gate, the church, with the metal ball and cross (which in pre-Mutiny days surmounted it) lying full of bullet holes in the compound. One is inclined to think that for these things alone life in Delhi might have been worth living, despite the "hot weather," mosquitoes, smells, malaria and other drawbacks. When one adds the excellent black-buck and small game shooting and the fishing in the Jumna at Okla, no doubt on the subject remains.

But all these things, the pleasant social intercourse, the historical associations, the shooting and fishing, formed but a very attractive frame-work to the real picture. It was the wonderful pig-sticking with which above all else one associates the Delhi of those days.

A certain garrison battery, shortly afterwards converted into a "company" by a stroke of the magic wand of H.R.H. The Duke of Cambridge, arrived in Delhi, and the senior subaltern took over the honorary secretaryship of the Tent Club. Few better men could have been found for the job. Though young in years he was old in craft, and soon learnt to pit his wits against the machinations of the mighty (but wily) boar. He was an absolutely fearless rider; full of strength, energy and endurance; equipped in short both with youth's daring vigour and manhood's fire. Physical pain, encountered frequently through tosses taken, seemed in his case to be a source of amusement, if not of actual pleasure. During the first year of his tenure of office he and an infantry subaltern did remarkably well, and were probably responsible for considerably more

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than half of the 160 odd pig whose death was recorded in the Tent Club log.

The junior subaltern of the battery, a fledgling from Woolwich and knowing nothing about pig-craft or any other kind of craft, tried hard until struck down by enteric within four months of his arrival in India. He lay on a bed of sickness for many weeks, and, in the intervals of wondering whether he was going to die of starvation (all solid food being taboo), used to look forward more than anything to the cheery visits of the senior subaltern. The latter had discovered a new hunting ground some 30 miles from Delhi, where accommodation could be obtained in a police bungalow at a village called Chansa. He described the many and varied beats which abounded in that neighbourhood; "the big jhow," a stretch of broken ground on the right bank of the Jumna, covered with long grass and tall shrub of the nature of tamarisk, called jhow, "the small jhow," a similar patch in which the jhow was not nearly so tall; the dâk jungle, some distance from the river, consisting of bushes with large flat leaf and red flower; "the nullahs," a long narrow strip of very broken ground roughly parallel with the river, and at an average distance of a mile from the beat known as "the big jhow"; several other small coverts where there were possibilities; and finally the "big bagh" or large plantation.

The big jhow gave scope for hunting instinct as well as hard riding. When the boar was first afoot he would go hard, and you had to ride hard through the jungle to keep him in view. When he found the pace beginning to tell he would take advantage of any thick patch in the jungle to jink, double, or even lie down. Here you should go slow, so as to avoid over-riding him. If you achieved your purpose and did not lose the pig, the odds were that he would suddenly dart off through comparatively light jungle to a neighbouring thicker patch. You had to look out for such a move and boost him for all you were worth across the light piece, being prepared to slow up again if the jungle became too thick. By no means every boar hunted in the big jhow was brought to bag, but it was possible for a good man on a good horse or pony to ride and kill a pig there by himself.

Throughout the small jhow a boar once afoot could be easily seen by the riders, who had to go for all they were worth all the

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time; otherwise there was a risk of the boar leaving the small jhow and of defeating his pursuers by gaining the big jhow, or some other neighbouring covert.

The dâk jungle stopped the horses slightly less than the big jhow. and the going was slightly better, though the line of the pig was sometimes more difficult to follow.

The beat known as "the nullahs" gave quite a variety to the sport. You could not gallop among them, as they were full of yawning chasms. The plan was to start the line of coolies a couple of miles up, and slowly beat along the tumbled ground, the spears riding a hundred yards or more in front. A sounder of pig alarmed by the noise of the beaters would get up and thread their way quietly amongst the chasms towards the open ground, the riders following them slowly at a walk or jog trot some distance in rear. When the sounder came near the end of the broken ground they would usually slip out to the left and make their way across the open plain to the big jhow. Sometimes they broke to the right and made for the dâk jungle. The riders then had to follow them as quickly as possible (an exit from the chasms presenting some difficulty in places), and then gallop for all they were worth in their endeavour to catch them whilst still in the open plain; for a blown pig, once he has gained fairly thick cover can often defeat a rider whose horse is also blown after extending himself for over a mile, and this perhaps on top of other runs which had taken place previously.

The big bagh again was unique. Imagine a huge enclosure full of trees, shrubs and bushes, so thick that it was impossible to ride pig in it. Around this enclosure was nothing but "maidan maidan" (as the natives describe the open plain) for a radius of over a mile and a half in any direction. The line would go in at one end, and induce large sounders to break at the opposite end, or sometimes from one of the sides. Woe betide the too eager sportsman who exposed himself before the pig had fairly broken, or who did not give the pig sufficient law when once they were out. They would stop, break back and return to their fastness, from which no power would move them again.

The senior subaltern would describe all the above in detail, enlivening his account by stories of actual runs. One day he might describe the big and the little jhow and, on taking his departure

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would say, "Well, so long; next time I'll tell you about the nullahs: but there's one thing that's certain, old man; if heaven is anything like Chansa, I hope I shall go there when I die!" The junior subaltern would lie and wonder if he would ever be fit enough to taste these delights. He was destined to do so the following year, and under the able tuition of the senior subaltern contributed largely to the bag of nearly 180 pig, the two between them accounting for about half that number. As regards horses, funds did not allow of anything much in quality or quantity; but by means of one or two really good country-bred ponies of 13·3 to 14 hands, a few old cavalry or artillery casters and so on they generally managed to get out twice a week and to spend an occasional ten days at Chansa. Of the beats described above— the two jhows, the nullahs and the dâk jungle afforded runs of varied interest; and as Sir Nigel of the White Company would have said, more merit was to be acquired from them than from the big bagh, because in them it was more difficult to follow the pig and the going was tricky and blind in places; whereas the country around the big bagh gave scope for pig-sticking of the drawing-room variety; nothing to stop the horse and no covert near enough to allow the pig to escape, once he had committed himself to the open. Nevertheless the big bagh looms large in the memory not only for its own isolated vastness but for two never-to-be-forgotten occasions.

One fine March afternoon the line was put in to beat the big bagh. There were two squads; one, headed by the senior subaltern and consisting of himself, "the wicked baronet" and a stranger policeman, who had come on a visit with quite a string of horses, stood at the far end of the big bagh; the other, headed by the junior subaltern, included the Delhi policeman and a subaltern of Native Infantry, and stood about half way along on the edge of one of the sides. Two small sounders broke on this side, in each of which was a boar. The junior subaltern went after the one furthest away from the line, soon got on terms with the boar and speared him. Meanwhile he had been joined by the senior subaltern and his squad, and, after the pig had been despatched, he was severely told off for riding a pig which (he was told) he should have left alone. There may have been some justification for this rebuke, since the junior subaltern's own squad had gone after the other sounder, and

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killed their boar without much difficulty. The senior subaltern (and hon. sec.), however, was furious because he said the bagh had not been properly beaten, and he was perhaps inclined to vent his spleen on the first convenient object. He next turned his attention to Buldeo the Tent Club shikari, and told him just what he thought of him. The old man affected surprise at first, saying that he had produced two boars in one beat, but the senior subaltern had been there before, and knew that there were scores, if not hundreds, of pig left behind. He therefore used language still more forcible. Buldeo grit his teeth and proceeded to reform the line at the end from which they had at first advanced, doubtless passing on the objurgations with interest.

Buldeo was a fine old man belonging to the Kanjars, a gypsy tribe, and lived in a village just outside the wall of Delhi City. Urbane and polished (though not obsequious) in his conversation with sahibs, tall for a native and well set-up and active despite his fifty odd years, smartly turned out in a pagri or turban with long tails hanging down his back, a sahib's cast-off coat, riding-breeches, boots and puttees, of handsome features of the Jewish type, he was an attractive old scoundrel. His venerable beard and slightly hooked nose brought the patriarchs to mind— not the more respectable ones such as Abraham, Isaac or Jacob—but Judah, say, or Reuben, after he had partially lived down his more disreputable days. He was a brave old man, and knew a great deal about shikar, especially of the *sus scrofa* species and their ways. His son, Ram Dyal, was also a pleasing looking ruffian, of swashbuckling mien and open countenance, who was quite as one imagines Esau to have been, about the time he was downed by his more respectable younger brother. Ram Dyal was a bold rider, and was sometimes very useful in picking up a lost pig, and in supplying a spare spear when one had broken one's own spear in the boar. Another son of Buldeo was a boy called Lal Ji—the Red One—because he wore an old red uniform coat. These Kanjars had no caste and would eat beef or pork or jackal with equal relish. Nevertheless they liked to call themselves by names well known in Hindu mythology. They were free in their manners without being familiar, and a few of them were sportsmen of the best type who understood the Englishman and his quaint ways, and still live in the memory of

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their sahibs as loyal servants and born sportsmen. They acted as non-commissioned officers in the line of beaters drawn from local villages under command of Buldeo, who, especially when mounted as he sometimes was, had the dignity and carriage of a field marshal.

By the time the line was reformed there were only three spears left, the two gunner officers and the stranger policeman; the remainder saying that with the morning's shikar and the early afternoon's burst their horses had had enough. The senior subaltern and the policeman went to the right hand side of the end of the big bagh, opposite to that on which the coolies were formed up; the junior subaltern being posted on the left with forcible injunctions from the honorary secretary to keep concealed on the fringe of the bagh, not to move an eyelash while the sounder of pig was emerging from cover, not to attempt to follow them until they had gone a quarter of a mile, and then to begin following them at a trot, gradually increasing to a gallop when they had got fairly going with their noses heading from covert. The senior subaltern and the policeman were reasonably well mounted, but the junior subaltern was riding a village tat borrowed for the occasion, having sent his own pony back to camp. He had already taken three first spears off the latter, two in the morning and one in the afternoon, and it was about time that the gallant little horse should have a rest.

The din made by the line of beaters came nearer and nearer, and they were doing their work thoroughly. Presently pig began to come out from the bagh, between the two spears on the right and the one on the left. They were huddled together and moving delicately, hesitating whether to return to their refuge, invaded as it was by a howling, tom-tom beating mob, or to trust themselves to the open where there was apparently no one to interfere with them. More and more came out, until the size of the sounder, composed of sows and squeakers with a plentiful sprinkling of boars, became so vast that the riders could only sit and gasp. Forward it moved at a slow pace in a sort of phalanx, and headed straight away into the open. After it had gone about a quarter of a mile the riders began to follow cautiously conforming their pace to that of the sounder and so nursing it further and further from covert. At last the honorary secretary gave the word to ride, and the three spears got going, each selecting his own boar.

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The senior subaltern got on to an old boar, who was not in galloping trim, ran up to him in less than half a mile, and gave him one deadly spear. Knowing that the pig would never get up again, he pursued a portion of the now scattered sounder, selected another boar and rode and killed this one also. This second boar fought, but it was not long before he, too, was disposed of. On his return the senior subaltern spied the policeman evidently in difficulties with his pig, who was charging repeatedly and had already cut the horse badly more than once. The policeman found it difficult to get his horse on the move, and being fairly new to the game was finding his problem a teasing one. He had speared the pig, but not very badly, and with a wounded horse the situation was unpleasant. Fortunately the senior subaltern came up, met the gallant boar's charge at a gallop, and it was not long before a third trophy fell to his spear.

Meanwhile the junior subaltern had gone off in another direction after a boar who led him a fine dance. The village pony he was riding was unctuous and well fed; and they must have gone for over three miles across the open plain before the rider could get on terms with the pig. He speared him at last in a small patch of cultivated ground. Soon afterwards the pig (who had also no doubt had a good feed that afternoon) changed his pace to a trot; the village tat followed suit; then the boar, exhausted, began to walk; so did the tat. Finally the boar halted, and the tat halted too. The boar, after pondering the situation, came to the conclusion that offensive action was called for, and pulling himself together came forward to the attack. So blown and beat was he that he could not get up the necessary pace, and though the horse could scarcely be moved the rider got in a good, downward jobbing spear. Another attempt at a charge with the same result. Then the boar, weak and bleeding, lay down. The tat refused to go near him, and as the boar had not a kick left in him it was no difficult matter to finish him off on foot. Ram Dyal arrived just as the junior subaltern was starting for home, and expressed his joy at finding him safe, saying that the senior subaltern had instructed him to scour the country and bring him back alive or dead. The junior subaltern was very much alive and perfectly happy, this being the

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first pig he had ever ridden and killed alone, and the fourth that day whose tushes he could claim as having taken first spear.

The result of the afternoon's beat of the big bagh was thus six pig in all, of whom no less than four were brought to bag by three spears out of one sounder. What looms largest in the memory, perhaps, is the enormous crowd of pig—probably nearly two hundred—cautiously committing themselves in phalanx to the open plain.

The second memorable occasion was some fourteen months later. The battery had been moved from Delhi, much to the grief of both gunner subalterns, who had been looking forward to another year's pigsticking. They each took six weeks' leave to Delhi during the hot weather, but were not able to go together. The first to arrive, after two or three weeks hunting in the nearer vicinity of Delhi, betook himself to Chansa in company with two infantry officers, who were strangers to Delhi and had not much experience of pigsticking; their presence there in the hot weather was a sporting effort. The trip to Chansa happened to coincide with the "chota barsath" or little rainy season, which in those parts generally occurs in May, and though it lasts only 3 or 4 days the rain during most of that time pours down continuously and fairly deluges the land which, dry as it is, soon soaks it in. The day after arriving at Chansa it was decided that as the country was unnegotiable almost everywhere owing to the torrential rain which had fallen on the previous day and night all three should go out and see whether they could pick up anything with rifles. One went off to the nullahs after chinkhara, another to the river after magar, while the gunner went to the neighbourhood of the big bagh in the hope of getting a shot at a black buck. With him went a young man whose real name was Gungru, but who usually answered to the more euphonious name of Parseddia. He was a nephew of Buldeo and was perhaps the best of all the Kanjars; unusually straight and honest; a pleasant companion; a good, keen and enthusiastic shikari. "Of all forms of shikar," he would say, "that of the wild boar is the best, for it is like unto war. The sahibs and shikaris have to make their plans for the enemy's undoing, but the boar is a formidable enemy, wise as well as valiant, and often defeats us by his wits. When it comes to a fight he is far braver than any tiger."

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The gunner had hacked out on a grey 14·2 country-bred called "The Stiff-un," who having been laid up for some little time was soft and fat. The sais had brought a hog-spear, so Parseddia suggested insidiously that he should try and turn out a boar from the big bagh. "How can you do that with only three coolies besides yourself?" asked the gunner. Parseddia replied with the Hindustani equivalent for "You never know your luck," and the sahib agreed. He mounted Stiff-un and took up his post in a clump of bushes. Parseddia spotted a good-sized boar and somehow succeeded in coaxing him out, and it was not long before he was cantering leisurely away from the bagh, looking like a moving portmanteau, with Parseddia running after him like a mad creature, yelling and waving several yards of dirty pagri. The rider followed the pig slowly, but the latter had not gone half a mile before he scented something uncanny, and stopped irresolute whether to return to covert or not. The rider of course halted too, and the boar made a wrong decision and went on for all he was worth. Although the going was over comparatively high ground it was still wet and sloppy; the horse was out of condition and the rider was not wearing spurs. Consequently a good distance was travelled before the quarry was overhauled, and just as the rider was beginning to get on terms with the pig the latter entered a belt of thorny kikar trees, which though fairly sparse were sufficient to compel the rider and horse to zigzag, whereas the pig had a straight run through under the thorny branches. They were now approaching a denser wood, and the rider saw that he must call on his horse to press the pig who was visibly tiring. Accordingly he soon found himself riding nearly level with the pig about ten yards to the left. A sharp turn back of the great head, a glint of the wicked little eye, and the rider knew what to expect. The thought had scarce crossed his mind, when he found himself receiving a lightning right-angle charge from the boar. This was stopped by a downward overhand spear-thrust which caught the boar well forward in the back. It was a good but not a deadly spear and the boar, more infuriated than ever by the wound, advanced to the attack by leaps and bounds. The horse, though a real good goer over broken ground after a running pig, was not always staunch against a charging one. Besides, these leaps in the air would have been enough to alarm any horse.

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Notwithstanding, the rider managed to get in another spear thrust which did not, however, touch the pig in a vital part. Close by lay a large fallen tree under the branches of which the beast took refuge, and there turned to face his pursuer. He must have been feeling weak; but his one desire was to wreak vengeance; and after collecting himself he advanced from the thicket, bounding in the air as he came. The rider tried to kick his horse into a canter, but the latter was too beat and probably too frightened to move. The boar jumped for the rider's leg, missed it, and then went for the poor old horse's off stifle-joint which he savaged badly. At the same time the boar was speared again, and he stood there apparently wondering whether he could collect his strength for another charge. The horse refused to face him, and the gallant boar retired slowly to the fallen tree and, taking cover under its branches, lay down watching his enemy.

In circumstances such as these, when the hunted is sorely wounded but may still have enough life left in him to escape, the hunter has but one object in view and that is to accomplish the death of the hunted as soon as possible, pressing him without giving him a breathing space. It is not only the desire to slay which influences him, but the more humane longing to put a noble animal quickly out of his pain. The gunner took his horse 100 yards away into the wood and, finding an old Hindu pilgrim, he persuaded him to hold the horse whilst he returned to the neighbourhood of the fallen tree. As he approached he saw the old boar lying, with his snout between his forelegs, apparently sick unto death. At a few yards' distance the gunner knelt on one knee, and with his spear "prepared to receive cavalry." The boar rose to his feet and advanced a couple of paces, the two facing each other for a space of about ten seconds in silence, broken only by the audible heart-beats of the human being. But the noble beast's bolt was shot; he wobbled and swayed, and turned and re-entered the thicket to the inexpressible relief of his enemy. The latter then approached the fallen tree and placed himself with the trunk between him and the boar who, staggering to his feet, still tried to fight. Another spear thrust and the mighty boar lay down to die, moving himself on his side under the branches, so as to be as far away as possible from the spear. The gunner then crawled in after him and finished him off.

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Some boars (even the bravest) cannot refrain from squeaking in their mortal agony; this one uttered never a groan, but just sighed away his parting breath.

The poor old horse was badly hurt, and eventually had to be shot. Though not one of the staunchest or the soundest he was a good honest goer who stood up well over bad country and was much regretted.

The story shows the extraordinary valour of the wild boar. It brings to mind Macaulay's description of the she-wolf, who "dies in silence, biting hard, amidst the baying hounds." Baden Powell, in his book "Pigsticking or Hoghunting" now (alas) out of print, quotes from a French writer somewhat as follows:—"J'ai souvent fréquenté le sanglier, et parmi nos animaux sauvages je ne trouve aucun aussi estimable; il est un brave, un chevalier sans peur et sans raproche, qui se bat jusqu'à la mort et meurt comme un héros." In this particular contest of chivalry the porcine combatant won, with neither of the others in the picture. Probably most will agree that the equine was a bad second and the human an "also ran."

One wonders whether Chansa is now even recognised as a meet, and in what year the big bagh was last beaten. Do the sojourners in Delhi of the present day obtain such glorious sport so easily and so cheaply? The annual bag may be bigger, but one suspects that the members of the Tent Club are not only more numerous but on the whole far more wealthy than the impecunious youngsters of our story, and that they travel to the distant meets in motor-cars instead of in *ekkas*. Perhaps the inpecunious ones of the present day find it as much as they can do to keep a motor-bicycle, and regard pig-sticking as a luxury beyond their means. If this is the case the account here given may convince them that good sport can be obtained with the cheapest of cattle, especially if the rest of the company is not, generally speaking, better mounted.

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NOTES ON FOREIGN JOURNALS.

Belgium.

Bulletin Belge des Sciences Militaires.—February, 1924.

A Belgian colonial mountain battery in German East Africa—with photos. and maps. (I.) Maj. Jadot.

France.

Revue d'Artillerie.—January, 1924.

The subdivision of light artillery in the Division. Gen. Broussaud.

Graphic methods in preparation of fire—employment of trench mortars—on preparation of fire—how to make sound ranging sections more suitable for mobile warfare—determination of the azimuth by graphic methods.

February, 1924.

Methods of admission to the military schools—employment of trench mortars (Concl.)—the artillery of Louis XIV—method of co-operation with infantry, etc.

An obituary notice of General Buat the celebrated French artilleryman who died on December 30, 1923, when Chief of the French General Staff.

Revue Militaire Française.—February, 1924.

General Maitre. Evolution of artillery methods during the war (with nine tables showing numbers and natures of guns in action at various periods). I.

German war doctrine of Sept. 1, 1921. (Concl.)
Working of the intelligence section of an Army Corps Staff.
The Autumn campaign of 1813.

Revue Militaire Générale.—January, 1924.

Was it a mistake for the Belgian army to fall back on Antwerp in August, 1914. Col. Nuyten.

Ludendorff's strategy on the Russian front. (IV.) Gen. Camon.
German Infantry methods of combat. III. Maj. Pujo.
Position and moving warfare. Lt.-Col. Lucas.

February, 1924.

The Germans as they see themselves. A. Pingaud.
Col. Nuyten's article concluded.
The French manœuvres. Lt.-Col. Jèze.

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Germany.

Heerestechnik, December, 1923.

Major Klie's article on the development of the light field howitzer and field gun is continued, giving some details of experimental equipments and the results obtained.

Oberleutnant Reimann, of the Inspectorate of Arms and Equipment, describes the battery boards now in use in the German army.

The article on gas-warfare is concluded. Quotations from Field Service Regulations, 1920, "The Royal Engineers' Journal," and "The Times," are designed to prove that England is preparing for gas-warfare in the future. Similar evidence is adduced concerning other countries.

C. Cranz very favourably reviews the work on "Internal Ballistics" by G. Schweikert, which has recently appeared.

No. 1. January, 1924.

Major Klie's article on the development of the '16 field gun and the '16 light field howitzer is continued. The introduction of the new models, the technical and industrial difficulties of production, and some earlier modifications of design are dealt with.

A second instalment of Major Klingbeil's article on war and peace-time experiences with concrete fortifications, permanent and temporary, deals with the foundations.

A notice of Lieutenant-General Geissler, who has just retired, is followed by a discussion of Capitaine Desaivre's article (*Revue d'Infanterie*, 1st May, 1923) on the abandonment by the French of their two century-old tradition "One type of infantry weapon and ammunition, and one calibre therefor."

Hauptmann Meyer-Becherer compares the steps taken by various countries for the mechanicalisation of their artillery transport.

No. 2. February, 1924.

The first two articles in the last number are continued. Dr. Becher writes an illustrated article on photographing projectiles in flight.

The review of Captain Desaivre's article on the impossibility of maintaining one uniform calibre for all infantry weapons is continued.

Herr Vahlen writes on "Deflections of the trajectory in theory and practice."

Hauptmann Justrow begins a review of Professor Brunswig's book "Explosive materials," which is written from the point of view of the chemist and physicist.

Militär Wissenschaftliche Mitteilungen. December-January.

Hauptmann Marcks writes an interesting essay on methods of attack and defence in the Great War. After sketching the original principles of the German, French and Russian General Staffs, he briefly traces their application or alteration during the war and concludes with his deductions. The tactical defensive and its sequel, the strategical offensive, have been vindicated.

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Militär Wochenblatt. No. 13. 10th January, 1924.

General Baron von Freytag-Loringhoven surveys the tremendous events of German history of the last ten years. He urges unity in the nation and steady work for an understanding not with "the unreliable Russian Soviet Republic, but with the Anglo-Saxon powers."

A review of Kurt Hesse's new book "The Triumph of Militarism," extracts tabulated statistics designed to show that, before and after the war, the chief Allies' expenditures on warlike preparations were and are greater than Germany's.

General von Kuhl opposes General von Landmann's suggestion that Germany should have first attacked Russia in 1914, and defends the deployment in the West, chiefly on the ground of opinions expressed at various times by the elder von Moltke and his successors.

Major Hüttmann reviews Hauptmann W. Pfeifer's interesting booklet on "March formation and the effects of aerial attacks." Pfeifer concludes that the only alternative to night marches will be to advance deployed through the zone in which enemy aircraft can operate. This will reduce the rate of advance to a maximum of 2 km. per hour.

No 14. 25th January.

General von Schoch reviews an article by Crozier in "The New Republic" on Winston Churchill's book "The World Crisis, 1915." The General thinks that Marlborough was the only great General ever produced by England, but, in spite of the lack of stars of the first magnitude, England has achieved a world-wide empire and will know how to defend it and again make its weight felt. "France will find that out one day." Therefore, he says, Germany must be on the side of the Anglo-Saxon peoples.

"Secret Powers" deals with Colonel Nicolai's book on intelligence work.

"Modern Leadership" (of troops) reviews Lieutenant-Colonel von Cochenhausen's book on this subject.

"The New British Infantry-gun" is a translation of an English article.

No. 15. 5th February, 1924.

"Military political notes on the Scandinavian states."

General v. Schoch quotes from E. D. Morel's "Foreign Affairs" to show that the French did not really withdraw their troops 10 k.m. from their frontier before the outbreak of war in the interests of peace, but solely for the sake of propaganda.

"Modern Leadership" is continued.

K. W. Liggemann gives his impressions of the the press of the Russian Soviet Republics, gathered during a tour of Petrograd and Moscow in 1923.

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No. 16. 15th February.

A review of Pierrefeu's book on the "Art of Leadership in the Field" opposes his conclusion that the personality of the leader no longer counts in war.

Müller-Loebnitz reviews Dr. W. Schulze's new edition of "The Battle of the Marne" in which the 'Marne drama' and the parts played therein by Lieutenant-Colonel Hentzsch, General von Bülow, and General von Moltke are exhaustively dealt with.

No. 17.

Military political survey of Russia for the Autumn of 1923.

Lieutenant-Colonel R. H. Beadon, C.B.E., R.A.S.C., contributes a review of the first part of the German Field Service Regulations (Führung und Gefecht), written from the British point of view.

A commentary on the agreement reached between Italy and Yugo-Slavia alleges that the motives which prompted this settlement of the Adriatic question were, that Italy wished to be free to deal with the Mediterranean question, Yugo-Slavia to devote herself to uniting her diverse constituent races.

Ober-Leutnant Dr. Kurt Hesse writes on "The Assault." In this first instalment he condemns present training methods as out of date and goes into perorations over the complications of modern warfare.

Artilleristiche Monatshefte. November-December, 1923.

Von Eberhard's memorandum on ballistics at long ranges is concluded.

January-February, 1924.

General Rohne writes on abnormal rounds (which fall outside the normal 100% zone of the gun) and the rules for dealing with these in ballistic experiment.

The same writer contributes an article on statistics of artillery in the Great War and quotes interesting figures from various German writers and from General Herr's book "L'artillerie."

H. Falkenhagen writes on the law of resistence of the air in ballistics.

Italy.

Rassegna dell' Esercito Italiano. November-December, 1923.

"Reflections on the Infantry Division" by Colonel A. Guillet, urges that the division should consist of three brigades each of two regiments. This would not be unwieldy nor difficult for one man to control. The division of three regiments has inadequate force in modern war; that of four regiments both lacks force and rational organization. The artillery of a division of three brigades should consist of two regiments of field artillery under a brigadier-general, this gives unity of fire command when required.

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Such a reorganization of the infantry division may well make it possible to dispense with the army corps organization entirely, thus effecting a considerable economy in personnel and time. In this case, the heavy field artillery and technical troops, normally at the disposal of the army corps, would have to be made over to the division.

The enormous development of mechanical transport has so revolutionised the supply system that one of the *raisons d'être* of the army corps has disappeared.

Thus we would have a powerful and mobile unit in the division, equipped for every contingency.

The writer urges the retention of the peace establishment of 30 divisions, bringing each up to the establishment indicated above.

This would obviate the necessity of finding numerous (at least 30) new divisional staffs on mobilization. These divisions would be united in groups according to strategic requirements. The road-space required by such a division on the march would be much less than that required by an army corps. In war, in addition to the general reserve, local tactical reserves for the divisions and groups of divisions will be necessary; these should consist of non-divisional brigades, which can be put into the line under the control of the commander already in action, thus avoiding changes of command in the line during critical phases. (The Japanese army has never had the army corps organization in peace or war.)

"Three or four regiments to the division," by Lieutenant-Colonel Prasca.

The armies of the principal belligerent states began the war with divisions composed of four regiments. Heavy losses during the war caused a reduction to three regiments per division in the case of the French and German armies. It is therefore opportune to consider this question of organization in the light of war experience. In accordance with the proportion of artillery allowed for a four-regiment division, a division with three regiments should have fifteen batteries. Such a division could then attack on a front of two kilometres and defend a front of four kilometres, within which limits a commander can efficiently follow its action.

On the other hand, as shown by the French regulations, this will involve the formation of a divisional reserve and divisional infantry reserves in addition to local reserves. The infantry commander will either be a nonentity, a time wasting pipe or a forceful character, who may have friction with the divisional commander.

German writers (notably Pfeifer) have declared strongly against the institution of a divisional infantry commander.

Ludendorff declares himself an unconditional advocate of the 12 battalion division. The present Italian battalions having only 988 men, against 1,186 in 1915, a 12 battalion division would be little stronger than the division of 9 battalions at 1915 strength.

Advantages claimed for the division with three regiments are the increase of artillery in proportion to man-power and the increased number of formations, which facilitates the formation of a mobile

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reserve and frequent reliefs. These could also be achieved by reducing each of the four regiments in a division to two battalions. Either system ensures the essential indivisibility of the infantry and artillery of the division.

The present German system of three regiments in a division was established under the treaty of Versailles. The French have probably only adopted the same system owing to their lack of effectives; their military writers are against it.

Italy suffers from neither disadvantage.

Switzerland.

Revue militaire Suisse. February, 1924.

The Artillery of 1914-1918. Col. Turrettini.

The German correspondent in his quarterly notes says that having learnt that in spite of the "shameful" disarmament imposed on Germany by the treaty of Versailles, the Swiss are interested in the development of the Reichswehr, and principally with regard to its training, he proposes in his notes to discuss the methods of infantry combat in accordance with the new training manuals.

He points out that the infantry of 1914 were brought up on the 1906 training manuals, which merely mentioned co-operation, but did not recognise its paramount importance. Battalions consisted of infantry armed with rifles only. One machine gun company was attached to a regiment.

At the commencement of the war the infantry often attacked alone, covered by its own fire, without close touch with or support from artillery. Any successes met with were due to the superiority of the officer and German infantry man. But, he points out, the casualties resulting from the line formation, and the density of the riflemen attacking were too great, and this and the ever increasing effect of modern arms (guns, aeroplanes, machine-guns, and tanks), caused the methods of combat to be completely changed. Armament and organisation of infantry also changed, and in 1921 "Führung und Gefecht der verbundenem waffen" (combined training), appeared followed by "Ausbildungsvorschrift für die Infanterie" (Infantry Training) in 1922. The writer says that these two books, based on the experience of the war, assure uniformity in training of officers and men. Combined training is of course based on the armament, etc., of a great modern power. Infantry Training now deals with present equipment and consists of a pocket book made up of six small volumes. The first volume contains general principles of combat and everything that the officer should know. The next three deal with the actual training and instruction. Vol. V is again for officers and deals with the running of the battalion and the regiment. Vol. VI is an appendix giving details of courses, etc.

The writer next reviews a book by Colonel Hierl on "War made with improvised armies"—in the following campaigns: America, 1775-1783; France, 1792-1794; Germany, 1813; France 1870-1871. He says that this book comes at an opportune moment as Germany's

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next war will be fought with improvised troops, and that as material preparation is forbidden, it is just as well to prepare for it theoretically.

The writer now makes this statement. "One knows that according to Lloyd George's confession, the decision at Versailles was based on Germany's responsibility for the war. When Edward VII, aided by Poincaré, Iswolski, Sassonow, etc., accomplished the encirclement of Germany 'they were certain that the German Emperor's love of peace would permit them to launch an attack when they pleased' (from Russian official publications). In fact, Germany only took up arms as a last resource, because it would have been suicidal to do otherwise. For this reason the publication of the monthly review *Die Kriegschuldfrage*, based on international publications comes at a timely moment to enlighten public opinion. From these documents Germany is absolved from responsibility. Happily public opinion in every country already is changing in our favour."

The editor of the *Revue militaire Suisse* in a footnote says that though he doesn't wish to hurt his correspondent he must contradict this statement, and goes on to discuss the question of the responsibility for the war and refers readers to certain documents.

The German correspondent goes on to say that unless the Versailles Treaty is revised, Germany, and with her the whole of Europe, will never be able to re-establish herself.

The correspondent next draws attention to two books—one "Lessons of the Great War" by Gen. Schwarte with about thirty collaborators. This is a second edition entirely recast, and whereas the first only dealt with the German Army, this includes the organisation and tactics of the foreign armies.

The second book is General Freytag-Loringhoven's "Men and things I have seen during my life," in which he contrasts the Bismarkian régime with that of William II, whom he describes as a bad judge of character, surrounded with bad advisers, hiding his weakness by posing as a strong man. The writer recommends this book as being very interesting reading and which may be said to be a history of Germany between the two wars 1870-71 and 1914-18.

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PRINCIPAL ADDITIONS TO THE LIBRARY.

Buat (General). Hindenburg et Ludendorff Strateges. Paris (Berger-Levrault), 1923.

Wardrop (Major-Genl. A. E.). Days and Nights with Indian Big Game. London (Macmillan), 1923.

"Arnewood" (Lieut.-Col. E. D. M. H. Cooke, D.S.O.). With the Guns East and West. (Privately printed.) 1923. (Presented by the Author.)

Cole (Capt. D. H.). Elementary Imperial Military Geography. London (Sifton, Praed), 1924. (Presented by the Publishers.)

Weber (Col. W. H. F.). A Field Artillery Group in Battle. London (R.A.I.), 1923. (Presented by the Author.)

Elwall (Alfred). Dictionnaire Anglais-Francais, and Francais-Anglais. 2 Vols. Paris (Delalain), 1920-22.

Younghusband (Major-Genl. Sir George J.). Forty Years a Soldier. London (Herbert Jenkins), 1923.

Dauzet (Pierre). Gloria. Histoire de la Guerre, 1914-1918. Paris (Hachette), 1919.

The Official History of Australia in the War of 1914-1918. Vol. XII—Photographic Record of the War. Sydney (Angus & Robertson), 1923. (Presented by the Publishers.)

Rose (J. Holland). The Development of European Nations, 1870-1921. London (Constable), 1923.

The Gallipoli Campaign. An Outline of the Military Operations. By "A Student." London (Sifton, Praed), 1923.

Cornish (Vaughan). The Great Capitals. An Historical Geography. London (Methuen), 1923.

Operations in Waziristan, 1919-1920. (Official.) Calcutta (Supt. Govt. Printing), 1921.

Roberts (P. E.). A Historical Geography of the British Dependencies. Vol. VII—India, Parts I & II. Oxford (Clarendon Press), 1916-1923.

Mowat (R. B.). A History of European Diplomacy, 1815-1914. London (Arnold), 1923.

Minutes of Proceedings of The Institution of Civil Engineers. Vol. 216. 1922-23, Part II. London, 1923. (Presented by the I.C.E.)

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Roberts (F.M., F.S., Earl). Letters written during the Indian Mutiny. London (Macmillan), 1924.

Army Organization and Administration. By "An Officer of the Line." London (Sifton, Praed), 1924.

Jones (E. H.). The Road to En-Dor. Being an account of how two Prisoners of War at Yozgad in Turkey won their way to freedom. London (John Lane), 1923.

Timmis (Major R. S.). Veterinary Notes. The Stableman's Companion. London (Forster, Groom), 1924. (Presented by the Publishers.)

Woodyatt (Major-Genl. Nigel). Under Ten Viceroys. Reminiscences of a Gurkha. London (Nisbet), 1923.

Inglefield (Capt. V. E.). The History of the Twentieth (Light) Division. London (Nisbet), 1921. (Presented by Lieut.-Col. A. E. Erskine, D.S.O.)

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PART II.

NOTES ON FOREIGN JOURNALS.

Belgium.

Bulletin Belge des Sciences Militaires. March, 1924.

Extracts and notes on German handbooks on artillery training. Notes on foreign armies: the German army and navy of to-day, collated from: *Deutsche Wehrmachtseinteilung (Reichsheer und Reichsmarine) nach dem Stande vom Winter 1923-1924*, and from Schwarte, *Die militärischen Lehren des Grossen Krieges.*

April, 1924.

The support of the advanced guard by artillery. Lt.-Gen. Hellebaut.

France.

Revue d'Artillerie. March, 1924.

Foreign ideas concerning artillery questions. Maj. Laurent.
Liaison between artillery and infantry in battle. Lt.-Col. Jèze.
The 155 L. Schneider model 17 in the war. Capt. Layral.
Irregularities in the fire of heavy guns. Col. Mercier.
On improved bilateral observation. Maj. Bloch.

Revue Militaire Française. March, 1924.

Gen. Maitre—evolution of ideas on the employment of artillery during the war.

Lt.-Col. Mollard—tendencies of the German infantry.

April, 1924.

Gen. Boullaire— the mechanicalised light division.

Lt.-Col. Velpry—armoured cars and tanks.

Revue Militaire Générale. March, 1924.

Attack of the 10th Colonial Division, 25th September, 1915. Maj. Janet.

Germany.

Militär Wochenblatt No. 18. 5th March, 1924.

General von Kuhl reviews the 4th volume of the Austrian Field Marshal Conrad von Hoetzendorf's memoirs.

Military-political notes of Great Britain refer scornfully to the pacifist utterances of the Under Secretary of State for Air and express regret that the speeches of General Smuts and Lord Curzon have not been followed by more concrete assistance to Germany.

Recent developments in the fighting services and in India are touched on briefly.

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Colonel Beadon's article on the British view of the German Field Service Regulations is concluded.

"Control Commission—Guarantee Commission" opposes the substitution of the latter for the former and any extension of the work of the former beyond the uncompleted points of the Treaty of Versailles.

Oberleutnant Kurt Hesse's article on "The Assault" is concluded. The writer considers that only a well trained army can attack in open formation. The German masses of the future, being untrained, will have to fight in well disciplined groups.

No. 19. 15th March.

"Some remarks on Gas Warfare" by v. Taysen. In the course of this paper, the writer alludes to the possibility of defending a position by placing a belt of gas in front of it, and on the offensive use of gas from the air.

"Lucius Cincinnatus" contributes notes on military political events in France.

General von Kuhl concludes his review of Field Marshal Conrad von Hoetzendorf's memoirs (4th volume) and takes exception to various reflections made by the Field Marshal on his late German allies.

Ex-Lieutenant Brandt suggests that an infantry gun could be designed for dealing with enemy strong-points and tanks. It should have a calibre of 5·5—5·7$^{c/m}$ recoil action and quick-firing breech mechanism and howitzer carriage. The shell for use against strong-points would be three times as long and heavy as that for use against tanks, thus attaining, in the former case, a big bursting effect and a range of some 2,000 metres and, in the latter, a high muzzle velocity and a range of some 3,000 metres.

No. 20. March 25th.

The aerial fighting forces of the Great Powers are compared.

"A technical survey" deals with relief maps, storage of ammunition, the infantry gun, field works, the motor-cycle in war, artillery tractors, rubber tyres, and uses of rubber solutions.

These surveys are of great value to military students.

A brief paragraph deals with the present Turkish forces.

Heerestechnik, No.3. March, 1924.

Dr. Becher's article on photography of artillery projectiles in daylight is continued. Details of the apparatus are given.

The article on uniform calibre for infantry weapons is concluded. The writer remarks that war produces specialization of weapons, peace their unity.

Cranz writes a short note on French articles on the theory of the kinetics of gas explosions in ballistics and on the life of fire-arms.

Hauptmann Meyer-Becherer's article on mechanical transport of artillery is concluded. Only America lays much stress on the mechanicalisation of artillery beyond that of the heavy and army

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reserve. No satisfactory model has yet been found. The ideal should be capable of a speed of 20—30 km. per hour without injury to guns or roads and also of moving at 4—6 km. per hour in a column without straining the engines; it must also be able to move cross-country. The writer, in a survey of the progress made in various countries, expresses his astonishment at the neglect of the four-wheel drive and laments the German lack of information on present developments in military mechanical transport.

Hauptmann Justrow's article on Professor Brunswig's work on explosive materials is continued.

Militär-wissenschaftliche Mitteilungen. February-March, 1924.

Major Wolfgang Muff writes an interesting paper on questions connected with the road movements of troops and transport. He points out that, whereas in the past primary importance has been laid on the battle and on military movements alternately, the present tendency is to regard both as requiring the most careful attention. Success in battle is impossible without the successful execution of the approach and deployment marches.

The relation to be maintained between frontage and depth is discussed and the influences on the question of the aeroplane, the long-range gun, mechanical transport, tanks and the necessity of continually relieving the front-line troops are referred to. It is pointed out that a modern division, marching on one road, cannot complete 25 km. in darkness between May and August, owing to the length of its column on the road. Suggestions are made for the movement of the supply columns.

The writer then considers in detail approach marches in connection with a battle and the desirability of delaying the action for a day's rest. Continuous night marching is wearing for the troops without getting the best results for their marching powers.

Deployment as a defence against aircraft and long-range artillery involves difficulties of command and movement. Various suggestions are made. Mechanical transport units of any size must move on different roads to the other troops or follow the columns in bounds, which will get shorter as the column draws nearer to the enemy.

The difficulties of staff work and communications are emphasized. It is probable that the subdivision of divisions into smaller groups of all arms marching on different roads will continue.

Switzerland.

Revue Militaire Suisse. March, 1924.

The high command and the staff. Gen. Grouard.

A legend. The failure of permanent fortifications during the great war. (Continued from November, 1923.) Jean Fleurer.

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Belgium.

Bulletin belge des Sciences Militaires. May, 1924.

Envelopment in War. (I.) Lt.-Gen. Baron de Heusch.

A Belgian colonial mountain battery in German East Africa. (Concl.) Maj. Jadot.

Cavalry and cyclists. (I.) Capt. Dugardin.

Verification of lines of fire. Col Grade.

Recruitment of officers for the Reichsheer.

France.

Revue d'Artillerie. April, 1924.

Syllabus of admission to the military colleges. Gen. Tanant.

Concentrations of fire.

The problem of a national motor spirit. "Gasogenes." Maj. Sainctavit.

Calculation of tables of parallaxes. Maj. Pellion.

The 77$^{m/m}$ Krupp anti-aircraft gun. Maj. Vauthier.

The life of tubes. (Translated from the German by Lieut.-Col. Gavard.) Capt. Justrow.

Revue Militaire Française. April and May, 1924.

Gen. Boullaire. The light motorized division. (I and II.)

Capt. Perré. Anti-tank defence.

Lt.-Col. Velpry. Armoured cars and tanks. (April.)

Revue Militaire Générale. April, 1924.

Attack of the 10th Colonial Division, 25th September, 1915. Major Janet.

Germany.

Artilleristiche Monatshefte, Nos. 207/208. March-April, 1924.

Lieutenant-General Rohne (the editor and a sturdy defender of shrapnel) contributes the first instalment of an article on the influence of the height of burst on the effectiveness of shrapnel. He maintains that the height of burst was not responsible for the lack of killing effect experienced with shrapnel during the war; this must have lain, he says, in errors in the range. He later remarks that the German method of raising the point of burst after ranging was to raise the trajectory (i.e. to add a false angle of sight); it is easy to forget to make a corresponding reduction in range and thereby to overshoot the target. Pre-war experiments led Germany to conclude that a blow of 8 m/kg. was adequate to put a man out of action, which

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required a striking velocity of 125 metres per second for bullets weighing 10 grammes. France stipulated that their shrapnel should put a horse out of action, which required 19 m/kg., they therefore used 12 gramme bullets with a striking velocity of 140 (?) metres per second.

Hauptmann Ritter reproduces Lieutenant-Colonel Broad's article on "Artillery Intelligence and Counter-Battery work" which appeared in the R.A. Journal for July and August, 1922.

General Rohne summarizes some of the war experiences of the French artillery given in General Herr's book and, in another article, quotes a French opinion in favour of shrapnel for area shooting especially against men in shell-holes and other emergency cover. This French officer estimates that shrapnel has 30 times the effect of high explosive shells of the same calibre in area-shooting (General Rohne's "conservative" estimate for this was 7 to 1). The General remarks that he knows of no other country besides Germany which has abolished shrapnel for field artillery.

Heerestechnik. April, 1924.

Hauptmann von Geisecke (of the Inspectorate of Arms and Equipment) begins an interesting article on the evolution of the German "G.S. wagon." An unsigned article on the history and development of carrier-pigeons is of interest.

Militär Wochenblatt. April 25th.

"Attack and Defence" quotes various modern writers (nearly all German) on the relative merits of defensive and offensive tactics, no very definite conclusion is reached, in fact a strong warning against slavery to dogma is given and illustrated by a reference to General von Willisen's (of Schleswig-Holstein) defeat at the battle of Idstedt, owing to his lack of faith in defensive tactics.

Switzerland.

Revue Militaire Suisse. April, 1924.

The High Command and the Staff. Col. Grouard.

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PRINCIPAL ADDITIONS TO THE LIBRARY.

Rimailho (Lt.-Col.). Artillerie de Campagne. Paris ((Gauthier-Villars), 1924.

(Presented by the Publishers.)

Schwarte (Generalleutnant M.). Die Deutsche Wehrmacht in Wort und Bild. Charlottenburg (Verlag "Offene Worte"), 1924.

(Presented by the Publishers.)

Seitz (Don. C.). Braxton Bragg: General of the Confederacy. Columbia S.C. (The State Company), 1924.

The Army in India and its Evolution. Calcutta (Supt. of Government Printing), 1924.

Candler (Edmund). The Long Road to Baghdad. 2 Vols. London (Cassell), 1919.

Elgood (Lieut.-Col. P. G.). Egypt and the Army. Oxford (University Press), 1924.

The Statesman's Year-Book, 1924.

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PART II.
NOTES ON FOREIGN JOURNALS.

Belgium.

Bulletin belge des Sciences Militaires. June, 1924.

Envelopment in War. (II.) Lt.-Gen. Baron de Heusch.

How geographical features affect war. (I.) Major de Grox.

The role of the light troops (cavalry, horse artillery and cyclists) of the army and army corps. Major Peteau.

Recruitment of officers for the Reichsheer.

Aviation notes.

France.

Revue d'Artillerie. May, 1924.

Heavy artillery organization centres. Maj. André.

Range tables and their accuracy. Maj. Dufrenois.

Scientific methods of fire. Lt. Morin.

Determination of topographical data. Maj. Benoist.

The life of tubes. (Translated from the German by Lt.-Col. Gavard). Capt. Justrow.

New German artillery handbooks. Maj. Laurent.

Revue Militaire Française. June, 1924.

Gen. Boullaire. The light motorized division. (Concl.).

Col. Mussel. The artillery of the VI. Corps at the battle of the Marne. (I).

Revue Militaire Générale. May, 1924.

Infantry in trench warfare. Maj. Padovani.

Germany.

Militär Wochenblatt. No. 24. May 5th, 1924.

"The Training of Men" emphasizes the dangers of narrowness and the necessity for a combination of discipline with powers of independent action. The continual insistence on this theme by German post-war writers shows that they have realized their weakness in this respect.

A "technical survey" touches on a camera for aerial survey, Dutch views on future artillery development, an American 15 c/m trench-mortar, Swiss harness, Kegresse tractors, substitutes for petrol for motor transport, an American view on tanks, Belgian methods of preventing the overhearing of telephone conversations, the protection of fortress garrisons and ships' crews from gas.

An article comments on the open formations now introduced for cavalry.

The article on the training of horse transport is continued and leaves no doubt that, conscientiously carried out, this training will render the personnel very fine all-round soldiers.

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No. 25. May 15th.

"A new Franco-German war" is a translation of part of an article by Lord Thomson, which appeared in the New York "The Nation."

"Mountain Warfare" by Hauptmann Kübler, reviews the book of this title by the Austrian Major Oberhauser. This is one of the semi-official publications brought out by the "Offene Worte" publishing firm and it is remarked that it supplies the lack of an official German text-book on the subject.

Oberleutnant Lanz gives some extracts and précis of (the French) Lieutenant-Colonel Lucas's interesting book "The Evolution of tactical ideas in France and Germany during the war 1914-1918."

Ex-Lieutenant Brandt writes on "The tanks of the future," remarking that Germany must study this question in order that, in case of necessity, she may not be "planted with rubbish which other countries do not want." He declares for the light tank on the ground of tactical and manufacturing advantages.

"Lucius Cincinnatus" ridicules French fears of German revenge and, as usual, digs at the Commission of Control.

An anonymous article reproduces all the reports about Mr. Grindell-Matthews "death-ray" and remarks that, if successfully developed, this will produce a much better atmosphere for British discussions with France.

No. 26. May 25th 1924.

A study of the new arrangement of the German Army List is followed by a survey of military-political events in Switzerland.

Ober-Leutnant Mahlmann, writing on "Infantry communications in the Attack," concludes that runners are the quickest and safest means of communication, at any rate within the battalion.

An article on the artillery in the modern battle against a position organized in depth demands a strong allotment of infantry guns and intelligent co-operation between the infantry and this branch of the artillery.

Heerestechnik. No. 5. May, 1924.

Dr. Becker's article on the daylight photography of artillery projectiles in flight is concluded.

Hauptmann von Giesecke's article on the evolution of the General Service waggon is continued.

Leutnant Arnold describes a miniature artillery range, in practising with which the director and scissors periscope are used and the gun is represented by a panorama sight. The writer emphasizes the necessity of accuracy of scale, time of visibility of "shell burst," &c. No new principles are enunciated.

Switzerland.

Revue Militaire Suisse. May, 1924.

The High Command and the Staff. Col. Grouard.

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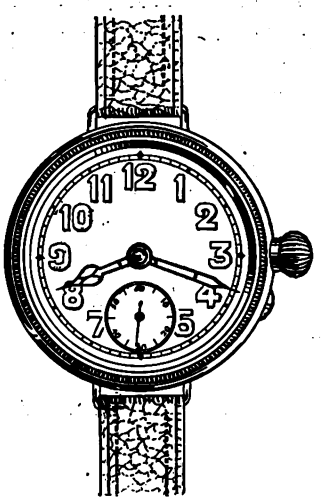

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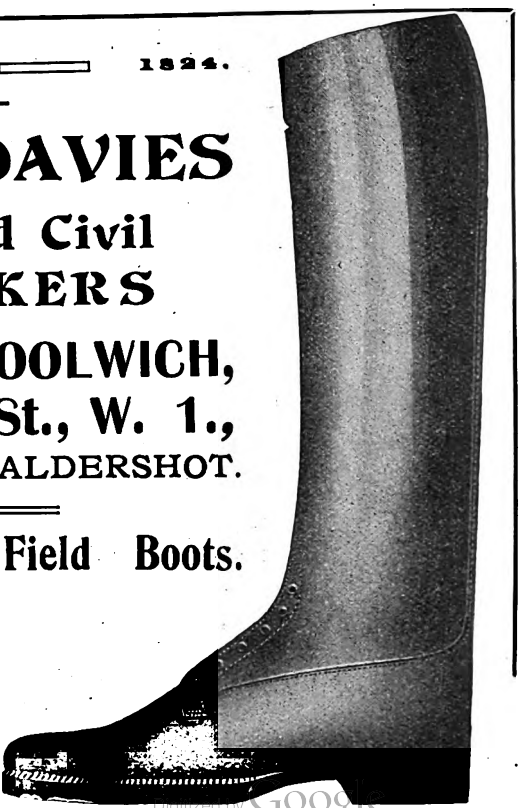

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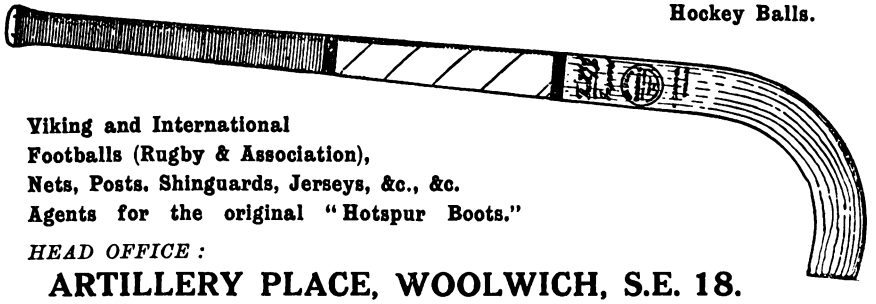

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